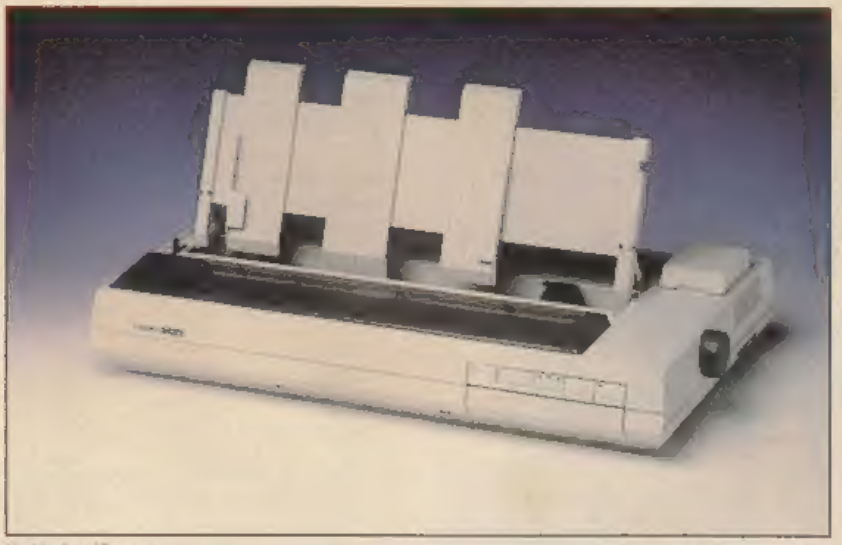
September 4–10 1987 Vol 6 No 35 60p

POPULAR Computing WEEKLY

HARDWARE

Upgrading your printer?

24-pin dot matrix models surveyed



NEWS DESK

Pressure on to cut price of Amiga 500

Pirates arrested in Torquay

GAMES

Mystic martial arts in Moebius

Accolade's Comics

Moebius from Microprose

POPULAR Computing WEEKLY

September 4–10

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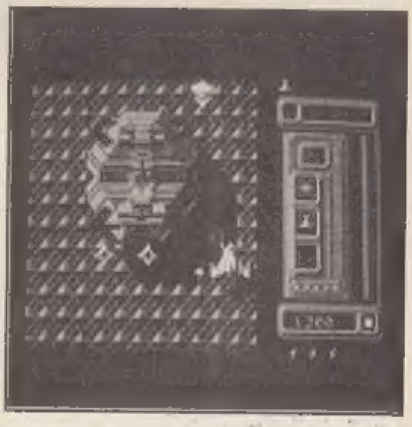

Programming

Games

Top: the NEC P6 one of the 24-pin dot matrix models in our selection. Above: the WS3000 modems, suitable for the comms beginner. Below: Goldrunner from Microdeal

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 ISSN 0265-0509

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LETTERS

Piracy – cause and effect

I am currently in the process of collating information for my A level General Studies project and would be grateful for assistance.

The area covered by the project is the controversial subject of piracy – of both software and musical recordings.

It will look at areas such as the causes and effects of piracy upon the companies which produce the originals, the legitimate consumer and the people who copy articles for any reason.

I would like to hear from other readers about their feelings towards pirates, the law, and the methods by which pirates copy – are double-deck cassette recorders abused, for example?

If the people who reply give me addresses for reference only, I will withhold this information upon request if they fear reprisals.

Could you please give me a contact address for FAST, the Federation Against Software Theft?

I am also helping a fellow student to find information about people's feelings about computers in social and environmental fields, the uses of computers today and future for control in the workshop and the home.

Richard Colley
87 Southbourne Avenue
Alumwell Estate
Walsall
West Midlands WS2 9UG

You can contact FAST on 01-430 2408.

Is copying necessary?

I am writing on the subject of software piracy. I agree that piracy harms the industry and is morally dubious, but there is not much that can be done.

My new Amiga 500 has drained almost all of my financial reserves, and the little money I have left I need for blank discs and programming books.

I simply cannot afford to buy software and I must depend on obtaining pirate copies.

However, while piracy damages the software industry, it is of great benefit to the computer industry as a whole. For example, I would not have been able to upgrade my C128 to the Amiga if all my money had gone on software. Revenue lost to the software houses, but gained by Commodore, supporting hardware manufacturers and publishers of Amiga books and magazines. Many of my friends are in the same position.

Russell Wallace
Co Dublin, Ireland

(The views expressed in this letter are not necessarily those of the editor and staff of *Popular Computing Weekly*.)

"Remember Alan Sugar saying his market was the truck driver and his wife?"

A Spanish micro mystery

While walking down a back street in Malaga whilst on holiday, I came across an impressive window display in a small computer shop (which was closed).

The computer on show was a Philips NMS (New Media System) and I found the graphics demonstration quite amazing.

I'm writing to ask if you know anything about this machine and its capabilities (resolution, colours, memory, price, etc).

Lee Barton
Runcorn

Philips' NMS is the company's MSX 2 system. MSX is going well in Spain, hence the machine's presence. It is not scheduled for launch in the UK.

Disc drive compatibility

I have decided to upgrade from my Sinclair QL to either an Atari STFM or a Commodore Amiga.

On my QL I currently use the Microperipherals $3\frac{1}{2}$ inch, one megabyte disc drive. Can you please tell me whether I will be able to use it as a second drive on either the ST or Amiga? This will greatly influence my choice of machine to buy.

Also, as it is impossible to buy an Amiga emulator for the ST, is it possible to buy an ST emulator for the Amiga? If so, is there any point in buying an ST?

Dipak Devalia
London NW9

We spoke to Microperipherals' technical department about your disc drive. They tell us that using the drive with either an Atari ST or Amiga is possible, but not without some internal modifications being made to the drive.

They suggested that if you knew exactly what you were doing, a DIY job would be feasible; if not, then a knowledgeable electrical store might carry out the work. Microperipherals itself would not take such a conversion on.

An ST emulator for the Amiga is certainly physically possible, but we do not know of any currently being sold. One company, AIR, has publicised an emulator, but as far as we can ascertain, has been unable to produce the goods.

Properly addressed

I would be grateful if you could give a list of addresses of manufacturers responsible for the Amiga, Commodore, Amstrad, Spectrum, Archimedes, Compaq, BBC, IBM PC, Memotech and MSX computers.

Addresses of Casio and Sharp for their hand held computers and calculators would also be helpful if at all possible.

Evan M Fraser
Glenrothes, Fife

OK, here goes: Commodore UK (C64, C128, Amiga), Commodore House, Gardner Road, Maidenhead, Berks; Amstrad Consumer Electronics (Amstrad, Spectrum), 169 Kings Road, Brentwood, Essex; Acorn Computers (Archimedes, BBC), Cambridge Technopark, 645 Newmarket Road, Cambridge; Compaq, Ambassador House, Paradise Road, Richmond, Surrey; IBM UK, PO Box 6, Havant, Hants; Memotech Computers, Unit 24, Station Lane Industrial Estate, Witney, Oxon; Casio Electronics, Unit 6, 1000 North Circular Road, London NW2; Sharp, Sharp House, Thorp Road, Newton Heath, Manchester M10.

There are around 10 to 12 companies which have produced MSX computers over the last three years and we haven't the space to list them all.

However, one of them, Sanyo Marubeni UK, is at 8 Greycaine Road, Greycaine Estate, Watford, Herts; and another, JVC, at JVC House, 12 Priestley Way, Eldonwall Trading Estate, London NW2.

All chess moves wanted

Re Chess Board, August 14. As a keen player who is also interested in chess computer programs I have been a regular reader of Martin Bryant's contributions.

I tried to play through the game between the Elite Avant Garde vs IGM John Van der Wiel, but, unfortunately, there appeared to be some omissions, eg, move 28, as well as a lack of distinction between actual moves played and those suggested.

Would it be possible to produce a listing of the actual moves made?

David Egdoll
Glasgow

It would.

White: John Van der Wiel
Black: Elite Avant Garde
1) c4 c5
2) Nf3 Nf6
3) g3 b6
4) Bg2 Bb7
5) Nc3 Nc6
6) 0-0 Nd4
7) e3 Nxf3+
8) Bxf3 Bxf3
9) Qxf3 e5
10) d3 Be7
11) e4 0-0
12) Bg5 d6
13) Bxf6 Bxf6
14) Nd5 Bg5
15) Qg4 h6
16) f4 exf4
17) gxf4 Bf6
18) Rab1 Bd4+
19) Kh1 Rb8
20) Rf3 b5
21) b3 bxc4
22) dxc4 Re8
23) Re1 Qa5
24) Re2 Qa3
25) h4 Qc1+
26) Kh2 Rxe4
27) Rxe4 Qc2+
28) Kh3 Qxe4

29) f5 Qe1
30) f6 Qh1
31) Kg3 Be5+
32) Kf2 g6
33) Qh3 Qb1
34) a4 Bd4+
35) Kg3 Rxb3
36) Rxb3 Qxb3+
37) Kh2 be5+
38) Kg2 Qxc4
39) Qc8+ Kh7
40) Ne7 Qe2+
41) Kg1 Bd4+
42) Kh1 Qf1+
43) Kh2 Be5 mate

Quirk of the furniture

I too am suffering from the same Memotech problems as M J Burrows (Peek & Poke, August 21).

It's akin to buying a set of dining chairs with one leg shorter than the others and being told that it's just a quirk of the furniture – "when lunch is programmed you'll have to put four of our housebricks under the short legs; this may or may not work".

Surely, offering for sale any product implies that it will perform to specification, in this case the manual, which it does not.

I look forward to possible rectification tips from your readers.

K Dawson
Spalding, Lincs

A friendly squeeze

Regarding "Memotech Letter Missing", from M J Burrows, Peek and Poke, August 21.

I have owned a Memotech MTX 512 since 1984, and have had many hours of pleasure using it.

The problem quoted is, in fact, well known to old MTX users.

The answer given is the way I cured the problem, or, I should say, a friendly TV man adjusted the horizontal hold inside the TV set, squeezing the picture in a bit, with no ill effects (I rented a set at the time, and the set has been with me ever since).

During adjustment, care must be taken to avoid the voltages that lurk inside television sets.

The address of Memotech Owners Club is, in fact, Phil Eyres, 13 Copse Road, Townhill Park, Southampton, as quoted in an earlier Letters page.

Orion Software (formally Syntaxsoft) runs another Memotech User Group, with a monthly magazine, *Memopad*. Its address is The Northbridge Centre, Elm Street, Burnley, Lancs BB10 1PD. This user group was started by Keith Hook some years ago.

Over the years both these user groups have been a positive lifeline to me, since information from other sources has been very scarce.

B Hibbert
Stockport

Supporting Archimedes

A lot has already been said about the Archimedes. However, I feel I must express a pro-Acorn view amid all of the condemnation, emanating mostly from the Atari and Commodore sectors. There are a number of points in R Ellerby's letter (*Popular*, August 21) which I would like to clear up.

Contrary to his belief, the Archimedes is not beyond the home user's budget, nor schools, which may see the Archimedes as an investment – technology which should last well into the 1990s.

In his letter, he also stated that RISC machines are very hard to program at low levels – this is completely false. I have been working with a RISC assembler for some time now and can honestly say that it is much easier to use than, say, Z80 or even 68000 code.

Acorn has lost out for some time by still producing revamped 8-bit machines when other manufacturers have moved on to 16-bit machines.

Now Acorn has gone one step beyond and produced a machine to top the lot. Too many ST and Amiga owners have dismissed the Archimedes as "no competition" – so my own personal plea is: will everyone please give it a chance, and it will prove it is a world-beater.

As to my Archimedes itself, I feel if I fork out £1,200 for a computer, could Acorn not have tried out a few different keyboards before opting for the "Spectrum" feel.

Michael Spalter
London NW7

Sponsors please

I am writing to you to enquire whether any of your manufacturers, retailers or supplier readers would be interested in sponsoring me in running a Bulletin Board system to advertise their products and services. I know a sufficient amount about IBM PC's and compatibles to be able to offer technical support for hardware and software.

If any company would like to get in touch with me could they contact me by one of the following: Richard Anthony Clafton, 3 Wykebeck Mount, Osmondthorpe, Leeds LS9 0HN, telephone: 0532 483597 (6pm onwards), or 0532 759741 (9am–4.30pm), or Prestel 532483597.

Richard Clafton
Leeds

Civilisation discovered

I would be very grateful if you would print this letter, so that I can inform the world of a new Play By Mail game to be launched on Monday September 7th 1987 called "Civilisations", which contains some elements that are believed to be unique in the field of PBM gaming.

For a player's start-up fee of a cool fiver and a subsequent 75p per game move you can make use of many services and interact with all the players in the game – at least when you meet them. There is even going to be a game magazine available soon after launch.

I'll tell you one interesting feature just to get you interested – a legal system within the game that can be used by all players as well as the police force (game, of course!). The idea opens up unlimited scope for a PBM game.

For a start-up pack or information write to Anthony White, Adventure Plus Enterprises, 11 Shrewsbury Road, London N11 2LL.

Anthony White
London N11

We're sorry but Popular Computing Weekly cannot guarantee to reply to *all* letters requesting a personal answer. It helps us enormously if readers are prepared to have general queries answered on these pages, so, if possible, please do not send SAEs.

Game One –honest!

Grovelling apologies are in order this week, to anyone who has been valiantly trying to follow Game One in the chess tournament, only to discover that we've been intent on publishing the same set of moves for Game Two over and over again (well, twice).

It's all down to the weather and the pressures of living in the post Big Bang society.

Anyway, here, at last, is the readers' move 24, and *Colossus*'s reply. The readers rejoined the attack, causing *Colossus* to defend by bringing its rook to e1.

Your vote counts

Which move do you think would keep the pressure on *Colossus*?

Send your suggested next move to *either* Inter-Mediates (*Popular* Chess), Freepost, Sawbridgeworth, Herts CM21 9YA (no stamp needed), *or Popular* Chess, Unit 2, The Maltings, Sawbridgeworth, Herts CM21 0PG (with a stamp).

Only one vote per person please, and all entries must reach either address by Wednesday, September 9.

The move which gets the most votes will be entered into the game. Results and *Colossus*'s response will be published in two weeks' time.

Next week, we return to Game Two, where the readers are playing white.

Game One

The moves so far:

1	Pe2-e4	Pc7-c5
2	Ng1-f3	Nb8-c6
3	Bf1-c4	Ng8-f6
4	Nf3-g5	Pd7-d5
5	Pe4xd5	Ng6-e5
6	Bc4-b5+	Pc7-c6
7	Pd5xc6	Pb7xc6
8	Bb5-e2	Ph7-h6
9	Ng5-f3	Pe5-e4
10	Nf3-e5	Bf8-d6
11	Pd2-d4	Pe4-d3 (en passant)
12	Ne5xd3	Qd8-c7
13	Nb1-c3	Ke8-g8 o-o
14	Pf2-f4	Qc7-b6
15	Nc3-e4	Qb6-d4
16	Pc2-c3	Qd4-g5
17	Ke1-g1 (o-o)	Rf8-e8
18	Be2-f3	Qd5-b5
19	Pb2-b3	Bc8-f5
20	Pc3-c4	Qb5-b7
21	Pc4-c5	Bd6-c7
22	Pg2-g4	Bf5xd3
23	Qd1xd3	Ra8-d8
24	Qd3xc3	Qb7-b5
25	Rf1-e1	?

Now Amiga 500 is set for price reduction

INDUSTRY speculation was rife last week about possible price changes go the Commodore Amiga A500, with some move almost certain between now and Christmas. A new price as low as £299 plus VAT, has been predicted.

Tradition in the micro industry would suggest that an extension of the current voucher promotion, offering £100 off the A500 or 1081 monitor or £200 off the pair to existing Commodore owners, is the most likely move.

The net effect of this promotion is to cut the A500 price tag to £399 plus VAT, and if the promotion is a success, it is likely that the offer will extend until Christmas.

Commodore UK was last week denying any talk of adjusting the price, or extending the offer, which is due to close on September 12th.

"We have no plans to do anything with the price of the A500," said Commodore UK Consumer Division sales manager Tom Hart last week.

"Nor are there any plans to extend the offer – it will end on 12th September."

But the signs are that the promotion is so successful that it would be surprising if it wasn't extended. Amiga distributor Zappo Computers' chairman Don Carter has been staggered by the effect of the promotion.

"A500 sales are currently phenomenal. The Amiga has moved from being a product that was important to us, but frankly didn't sell very fast, to being a product that is currently our fastest-selling computer," he said.

Tom Hart: no plans yet

This contrasts with the position in Germany, where it appears that poor sales have given rise to unofficial, or "grey" imports to the UK (see *Popular Computing Weekly*, August 28 and News Analysis, this week). Sources have suggested that German operators may press for a similar promotion there, and this too would point to a UK extension.

Looking to the future, some observers are also convinced that current events would make a permanent price cut after Christmas inevitable.

Konix Speed King waggle winner

KONIX has claimed responsibility for this picture, and says it shows the lucky winner of its Speed King Joystick Waggle competition, Maris Geert of Belgium.

Maris won £100 for guessing that the Speed King would last 643 hours – or 26 days, 19 hours – of continuous waggling. The correct figure was 652 hours, or 27 days, four hours. At a rate of 450 wpm (waggles per minute, of course), the test involved a total of 17,604,000 waggles.

"I had heard how durable the Speed King is, and so I worked out how long decent joysticks should last when playing *Daley Thompson's Decathlon*, doubled it – et voila!" said Geert.

Sparks flying after CSD's Maynard deal

A DISPUTE has arisen over the rights to a number of games on the Sparklers label, formerly owned by the distribution house CSD, which is now in receivership.

A deal was signed on August 21 assigning rights to the Sparklers range to Maynard International (see *Popular Computing Weekly*, August 28). Since then, Bob Brenchley of Nationsoft has argued that the rights to eight of its titles, which were licensed to CSD, have now reverted back to Nationsoft.

Brenchley has claimed in the trade press that "the titles reverted back to us if they weren't marketed within 18 months, they ceased to market the program, or if the licensee ceases to trade or enters into liquidation."

Maynard International has denied that this is the case and Nigel Ruddock, of receivers Robson Rhodes, has had little contact with Brenchley.

"We're not sure what the essence of his claim is," Ruddock told *Popular Computing Weekly*. "So we're not in a position to comment. It's up to him to press his claim with us."

PCW decision aid

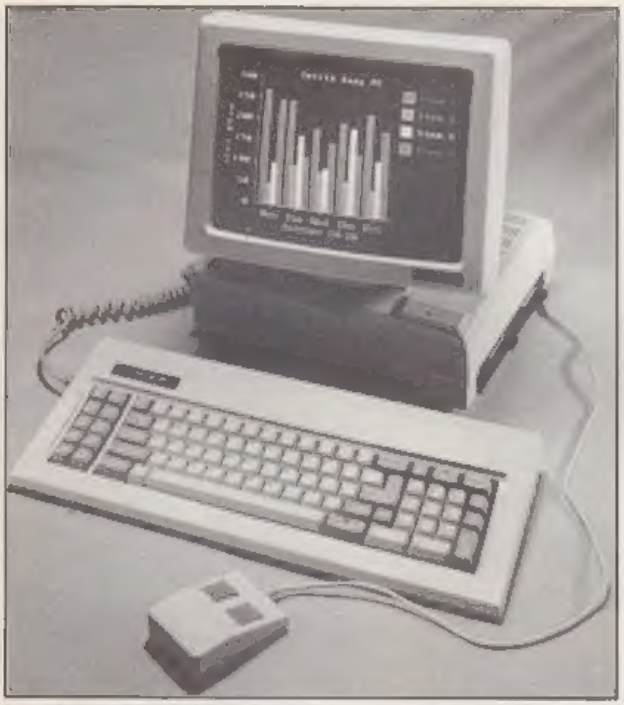
THE first expert system for the Amstrad PCWs made its debut last week. *Second Opinion* is more accurately described as a decision aid, according to publisher HeptaCon.

The menu-driven product is primarily aimed at the personnel and management consultancy markets.

But HeptaCon makes it clear that there are many home uses, including house or car buying. Second Opinion comes with a home software price tag, too – £42.75 including VAT, postage and packing.

Second Opinion is available by mail order, from HeptaCon, Suite 500, Chesham House, 150 Regent Street, London W1R 5FA. Telephone: 01-734 5351.

New heights for Zenith with cheap PC clone launch



ZENITH has taken steps to strengthen its position in the crowded PC clone market with last week's launch of the Eazy PC, which starts at £587 inclusive.

The move is a clear attempt to knock Amstrad's PC1640 on the head in its attack on the vast corporate market, but is also aimed at home and educational markets. Delivery starts later this month.

"Zenith looks as though it's in direct competition with the 1640," said Ruth Keattch of analyst Phillips and Drew. "And the Amstrad seems to offer no advantage whatsoever."

In specification terms, the Eazy PCs are something of a PC1512 and a half competitor. All three Eazy models have 512K Ram expandable to 640K, keyboard, MS-DOS 3.2, MS-DOS Manager (Zenith's proprietary user interface), parallel port and, on hard disc models, a mouse as standard. All models come with a 14 inch black-on-white CGA mono monitor.

The entry-level Model 1 has one 720K 3½ inch floppy disc drive, price £587 inclusive; Model 2 has two 720K 3½ inch floppies, price £705 inclusive; and Model 3 has a 20Mb hard disc drive and one 3½ inch floppy drive, price £1057 inclusive.

Zenith is keen to point out the Eazy's compatibility with existing and future competitors – especially IBM's Personal System 2.

"The Eazy PC is an entrylevel system for serious professional and corporate users with consistent upgrade to Microsoft Windows II, Windows 386, OS/2 and SAA," said Zenith UK managing director Clive Taylor.

More news on page 10

SOFTWARE HOTLINES

Once more we peer into the murky pre-*PCW* void to see if there's any signs of life, and come up wondering why we bothered. It's worth mentioning, though, that while there's a relative lack of new games down at the 8-bit end of the market, 16-bit software is becoming noticeably more abundant.

Most of **Rainbird's** releases these days are originated on 16-bit machines and converted downwards. That includes its next **Level 9** trilogy for the ST, *Time and Magik* (pictured below).

This brings together updated versions of *Lords of Time*, *Red Moon* and *The Price of Magik*, with new graphics and the sophisticated parser that it's used in their last few games.

I've just finished reviewing **Microprose**'s *Moebius*, and straight away there's news of even more kung-fu games.

Gremlin has put the finishing touches to *Samurai Trilogy*. The trilogy bit refers to the three modes of combat that you have to endure in order to complete the game: Karate, Samurai and Kendo.

It's a bit more complicated than some martial arts games, as there are also three training routines which you can concentrate on, honing various abilities depending on your judgement of your opponent's strengths and weaknesses.

Activision is also joining the fray with *International Karate II*, the follow up to System 3's recent hit. This time, though, they've given you a second opponent so that you can play against the computer and another player at the same time.

To cope with all this extra action you've got some flash new moves that you can perform, including a nice line in backflips and doing the splits in mid-air so that you can kick both opponents in the head at once (that's my kind of game!).

The Spectrum version of *Samurai* should be in the shops any day now, while *IKII* is due on the C64 in a month or so.

Firebird is finishing off *Scary Monsters*, featuring a character called Norma Slama (there's a smutty pun there, but I haven't worked it out yet). Norma's been kidnapped by some mad loon and imprisoned on an island that's full of evil spirits.

Scary Monsters has a fast loading routine even on the disc version – look out for a review soon.

I don't know if there's anyone there who's actually got an Archimedes yet, but **Superior Software** has already got *Zarch* lined up – the first third party Archimedes game that I've heard of.

Superior has produced some of the best games for the BBC machines in the past and it's making great claims for *Zarch*, but, of course, you won't be able to see it until – guess when – the *PCW* show.

And, speaking of That Show, one year after its first public appearance, *Star Trek* will be beaming down to the show again this year. Ah, but is it finished? A voice from Firebird says, "all we can promise is that *Star Trek* will be *previewed* at the show."

Oh well, la plus ça change and all that. Beam me up, Scotty.

Cliff Joseph

NEW AM
NOW OTHER HOME COM

Amiga 500 is here.

With a mind-blowing array of features and capabilities.

And a £499‡ price ticket (ex VAT), hundreds of pounds less than anyone could have predicted.

"...a miracle of compression..." writes *Popular Computing Weekly** "...it all adds up to a formidable system which is clearly better than anything else at the price."

This elegant little machine takes family computing into new dimensions of creativity, excitement and productivity.

It outruns and outguns office PCs as a business multi-tasker, performing a deskful of different jobs simultaneously, at over 7 million steps per second in realtime.

So other home computers may not be the only machines it consigns to the toy cupboard.

AMAZING SCIENCE FACT!

Amiga is used by Disney, Universal and other Hollywood studios for its dazzling 3D graphics manipulation and animation powers.

A sophisticated high-speed graphics processor called a blitter chip transforms images in realtime.

You can paint the screen with more than 4,000 colours. Create and modify designs and effects as you like, with pin-sharp resolution.

You command an almost limitless workshopful of stunning professional graphics capabilities.

With an optional Genlock interface, you can capture images off videotape. Manipulate and mix them with graphics. Then re-transfer them to videotape!

This means you can produce spectacular special effects like those created by Amiga computers for Channel 4's *Chart Show* and the American TV science fiction series *Amazing Stories.*

YOU AIN'T HEARD NOTHING YET!

Concealed within the sleek Amiga shape, there is also a pro-quality sound synthesiser and four-track stereo sound system.

Driven by another powerful and unique custom chip, it can synthesise musical instruments and

‡Includes DeluxePaint from Electronic Arts worth £79 + VAT! (Excludes monitor or TV modulator.)

COMMODORE BUSINESS MACHINES (UK) LTD, COMMODORE HOUSE, THE SWITCHBACK, GARDNER ROAD, MAIDENHEAD, BERKSHIRE SL6 7XA TELEPHONE: (0628) 770088 TELEX: 846057 CBMUKG

IGA 500.
PUTERS ARE JUST TOYS.

sound effects.

An optional digitiser allows you to take onboard real sounds. Mix and modify the two. Translate your compositions from keyboard to sheet music. Play them back through the monitor's speaker or your hi-fi.

Your Amiga can also synthesise the human voice.

It can speak back anything you care to write on the keyboard.

So this is one computer that can not only word process with faultless professionalism, and incorporate superlative graphics into the text, it can also read the text back to you aloud.

GAMESMANSHIP AND WORKMANSHIP!

The new Amiga 500, in fact, dumbfounds its competitors in every way.

Graphics, stereo sound, multi windowing, multi screens, 512K to 1Mb RAM (expandable by an incredible 8 further megabytes externally**), 3½" internal disk drive with 880K of mass memory, 4 unique dedicated chips plus the 16/32-bit power and 7.14MHz speed of its central processor, communications and vast expansion potential all add up to a computer of immense professional capability.

Yet the same technology allows the Amiga 500 to play games so mind bending that only full-scale arcade machines have been able to play them until now.

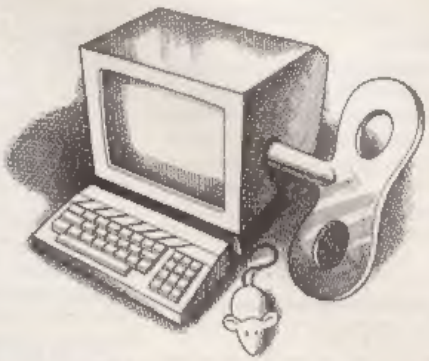
AND AMIGA MEANS 'FRIEND'!

However many of the Amiga's extraordinary talents you find yourself using, they will all be beautifully simple and natural.

You will be totally at home in the friendly and effortless Amiga environment, where everything happens by windows, icons, mouse and pulldown menus.

And the Amiga 500 simplifies life in another way too.

There is now no comparable home computer. At any price.



Try the astonishing new Amiga 500 at your nearest Commodore Amiga dealer.

And discover why *Personal Computer World*†, having tested the graphics performance of Amiga's latest and most powerful rival, concluded "...Amiga still reigns supreme..."

AMIGA

Commodore

*Popular Computing Weekly, 22-28 May 1987. †Personal Computer World, February 1987. **Subject to availability.

DIARY DATES

SEPTEMBER

12 September
North-West England Dragon Show & Convention
Bishop Henshaw Upper School, Thornham, Rochdale
Details: Software, demonstrations, clinic etc
Price: £1.50, £1.00
Organiser: Pulser Software (0706) 849189

23–27 September
Personal Computer World Show
Olympia, London
Details: Latest hardware, software and peripherals for business and leisure computing
Price: £3, £2 – (parties over 10)
Organiser: Montbuild 01-486 1951

OCTOBER

15–17 October
Desktop Publishing Show
Business Design Centre, London
Details: Demonstrations of latest hardware and peripherals, plus seminars and user clinics
Organiser: Database Exhibitions, 061-456 8383

NOVEMBER

14 November
National Einstein Exhibition
National Motorcycle Museum, Birmingham
Details: Einstein software etc.
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Amstrad gets shares lift by watching TV

AMSTRAD's share price reversed its downward trend last week at stories that the consumer electronics company is to go into partnership with a satellite broadcasting consortium next year.

Recent weeks have seen City confidence in Alan Sugar's company at a low ebb with some observers seeing trouble ahead in Amstrad's reliance on the uncertain PC market.

Analyst Phillips and Drew has been issuing sell recommendations on Amstrad shares all summer, and wasn't impressed by the 10p rise in the share price last Tuesday, prompted by the satellite news.

"Satellite TV is something that Amstrad has been looking at for a long time," said P&D's Ruth Keattch.

"We see Amstrad running into sales problems in '87/88, because computer sales are beginning to come under pressure.

"We would like to see the company diversifying into something now, and we were hoping that Amstrad would have announced a move into white goods. But it does appear to have missed opportunities," she added.

Amstrad itself cast some doubt on the satellite collaboration by issuing the following statement: "Amstrad is watching the market for satellite television reception, and if this market ever becomes popular resulting in high demand for receiving equipment it is not unreasonable to assume Amstrad will have an extreme interest in becoming a major vendor."

Recommendations described as "more bullish" than those of Phillips and Drew were being sent out last week by analysts at Barclays de Zoete Wedd and Chase, among others, and Amstrad shares continued to rise during the week.

Alan Sugar: needs to diversify, say analysts

FAST joins police in illegal software swoop

DETECTIVES last week mounted a successful joint exercise with the Federation Against Software Theft to crack down on an illegal business software operation in Torquay.

Torquay CID announced that Gerhard Werner Martens, a German national, had been arrested and charged with one offence of forging a number of computer discs, and one of importing manuals illegally.

Martens was a director of TOS International, a company which had advertised extensively in the computer press. Detective Sergeant Edwards of Torquay CID said that a joint investigation with FAST had been mounted after complaints had been received from a number of other companies.

D/S Edwards added that Martens might face further charges under the Copyright Act, including forgery and importing discs illegally.

Martens' next remand hearing is due this week.

Infogrames aims to help Band Aid

INFOGRAMES' autumn release schedule features a game which is intended to raise money for Band Aid. It also includes a number of new versions of previous releases and new titles for the Amiga.

Sidewalk features a motorbike which is stolen on the way to a Band Aid concert. The object is to recover motorbike, tickets and - naturally - the girlfriend, before she goes off with someone else.

Infogrames has made it clear that a minimum of 15p will be donated to Band Aid from the proceeds of each copy of *Sidewalk* sold. *Sidewalk* will be available later this month for Atari ST (£19.95), PC (£24.95), Amstrad CPC (£9.95 and £14.95).

This month also sees the sequel to *Passengers on the Wind*. *Passengers on the Wind II* will be available on Atari ST (£19.95), PC (£24.95), C64 (£12.95 and £14.95), Amstrad CPC (£12.95 and £14.95) and, in October, Commodore Amiga (£29.95).

Other titles scheduled include the latest in the crime series, *L'Affaire Vera Cruz* for the PC, and PC, ST and Amiga versions of *Three Musketeers*.

MSX owners will welcome the October release of *Camelot Warriors* and the Spanish-originated *Abu Simnel Profanation*, both price £9.95.

Archimedes on course for shops

ACORN'S Archimedes micros are starting to ship to dealers, and are on schedule to begin volume production and delivery during September.

"We have our dealer network and we have a number of retailers in the high street, who will be getting machines around the middle of September," said Acorn's Stephanie Newman.

Doubts had been expressed whether Archimedes operating system would be in Rom, or on disc. Acorn has confirmed that it will be in Rom.

NEXT WEEK

Sound effects

Kenn Garroch continues his guide to computer sound chips and how to program them to create sound effects in your own routines.

Max

AMS's MAX aims to give your Amstrad CPC that Macintosh look with a Wimp (window, icon, menu, pointer) desktop system for any CPC with a disc drive.

Duncan Evans puts Max through its paces, and reports on its performance.

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Jason's Gem
Journey's End
Holy Grail
Sinbad and the Golden Ship
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Soul of a Robot
Space Hunter
Inc. Shrinking Fireman
Ticket to Ride
Sky Ranger
ZZZZZ
Lap of the Gods
Octagon Squad
Kane
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Pippa
Hyper Bowl
Future Games
Master Chess
Milk Race
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Colony
Invasion
Jackle & Wicle
Gulliron
Wollen

Commodore 64
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Master of the Lamps
Commando
Special Delivery
Wing Commander
Snodgits
Everyone's a Wally
Jaya Jim
Beach Head
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Zaxxon
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Frantic Freddie
Jinn Genie
Countdown to Meltdown
River Rescue
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Caesar the Cat
Herberts Dummy Run
Confuzion
Groga Revenge
1985
One Man & His Droid
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Nonterraqueous
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Vegas Jackpot
BMX Racer
Challenger
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Zoids Patrol
Parsy
PSI Warrior
Go for Gold
Redhawk
Back to the Future

Amstrad
Meltdown
Alien
Beach Head
Defend or Die
World Cup '86
Yie Ar Kung Fu
Sweevo's World
Exploding Fist
Fantastic Voyage
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IMPORTING IN SHADES OF GREY

John Brissenden addresses the question of Commodore's inaction over the unofficially imported Amiga 500s

THE current revelations of unofficial imports of A500 Amigas raise the vexed question of consumer rights versus the computer industry.

There is nothing new about unofficial, or 'grey', imports in the computer or similar industries. Only 18 months or so ago, there was a flurry of panic, as the threat of Spectrums bought in en masse from Brazil loomed.

But this situation puts a rather different slant on things. Commodore is a truly multinational corporation, with dealers all across the USA, Europe and Japan.

Suddenly, reports of "dodgy" computers being sold by dealers start to come in. Commodore warns people against buying them, naturally enough, and vows to catch up with those responsible. Are they forgeries, knocked together in a disused warehouse, filled with cardboard?

Well, no. Actually they are perfectly legitimate Commodore machines which dealers, distributors or other persons unknown in Europe have offloaded at bargain-basement prices onto the UK market.

Malfunction

The problem is that they conform to European specification and standards, ie, have round-pin plugs and run on a 220V power supply. They have been supplied with bogus UK warranty cards as well. If, as is likely, they malfunction when used in the UK, the hapless customer is at the mercy of the dealer who bought them in the first place.

If the dealer bought them unwittingly, then that customer is landed with a stupid dealer.

But what if the dealer knew all along? Then the customer is up against an unscrupulous operator, and may end up hundreds of pounds down on the deal. This situation is to say the least unfortunate. Firstly the fact that there are still differing electrical standards between EEC member countries is astounding.

And why is Commodore not able to offer the customer any more than advice?

Commodore UK boss Steve Franklin has recently said three salient things regarding the matter.

Unofficial imports

He advised customers to be careful. He has said it is impossible to stamp out unoffical imports of any manufactured goods. And finally he said that the customer is the most important party, the one who must be protected.

But in the next breath Franklin admitted there is little or any action Commodore can take over this particular incident.

While there are clearly very good reasons why all the above may be true, it is also not unreasonable to think this is not good enough. The computer industry is big and ugly enough to look after itself, so why not, as Franklin says, look after the customer too?

Clearly the reality is rather more complicated. Don Carter is chairman of Zappo Computers, the UK's largest Commodore distributor, and he sums up Commodore's position.

"I think Commodore are in a very difficult position. Under the Treaty of Rome we are in a free market, so there's no reason why products shouldn't be imported into this country from Europe. Commodore would stand in contravention of the Treaty if it tried to stop those imports," he says.

That explains why the company hasn't taken stronger action, despite making a great deal of noise about the affair. So why is Commodore so anxious to draw people's attention to it, apart from "protecting the customer"?

Obviously Commodore aren't thrilled that someone in Europe is screwing up their market, but on the other hand have a duty to warn people that these products are not UK products. The technical subtlety is of significance," Carter continued.

"These products coming in from Europe have not been through UK quality control, or the retailer's or distributor's quality control. So there is every possibility that they will be more prone to failure. I don't think Commodore can do any more, to be honest."

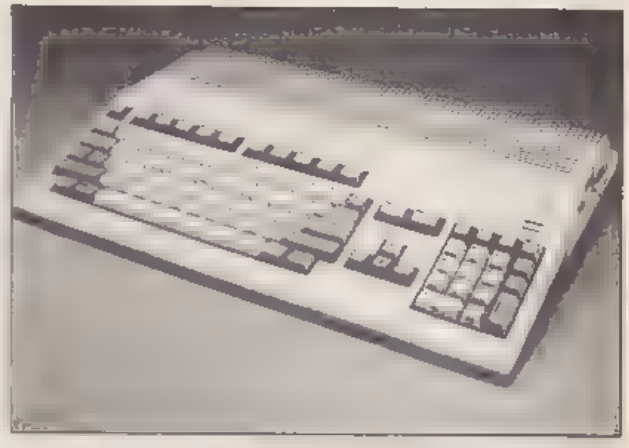
Now there is a twist to this. Franklin is genuine when he speaks of protecting the customer, but some have expressed the view that the recent fuss has been sour grapes on Commodore UK's part, annoyance at the way that certain parties have conspired to take sales away from them.

Not only that, but the grey imports affair has, in Carter's view, ultimately helped the customer by forcing Commodore UK to compete with the price of the 'unofficial' Amigas.

"In the early days, the Amiga didn't sell well Europe-wide. All the companies had targets to achieve, and some dealers and distributors tried to engineer prices which resulted in the machines coming in at silly prices," he says.

"Commodore UK put a stop to it, and the only reason that the grey imports have ceased is that the promotion that Commodore UK is offering is better than the price of the grey imports. Grey imports prosper when there is a market for them," Carter adds.

So there it is. Grey imports cut both ways, and if the spending power of the ordinary consumer is strong enough, it is the buyer who wins.



The Amiga 500: "grey" versions have been on sale to unwary customers

The powers of

High quality printed output doesn't necessarily mean splashing out on a daisywheel or waiting for laser prices to drop. Tony Kendle and Chris Jenkins look at the features offered by 24-pin dot matrix printers.

Standard dot matrix printers use (on the whole) a 9-pin vertical print head to ink in each printed letter as a combination of dots. Increase that head to 24 pins and your print resolution nears true letter quality without sacrificing any of the speed of the lower specification models.

Inevitably, 24-pin printers cost a fair bit more, but if you shop around you'll find they needn't break the bank.

NEC P6

As 24-pin printers go, the NEC P6 is rather long in the tooth. This does not mean that there is anything wrong with it, it is a superb machine, but rather that it is relatively well supported by software and often available at a discount price. Although the list price from NEC is over £500, it can commonly be picked up for around £380 and makes an irresistible entry level 24-pin machine.

The P6 has an automatic single sheet feed-through mechanism which works well but there is no inbuilt tractor feed (at dealer rather than NEC list prices it costs about £30 to add a simple one. £120 for a bi-directional tractor). A proper sheet feeder option exists (about £160) which worked well for the whole of the test period – at times it is a bit slow because it really goes to town on feeding the old paper out. However, it is reliable, doesn't jam as long as you use the recommended paper weights, and can be left alone for an entire print run without worry.

You do not have the option to use plug in fonts on the P6/P7 models unless you first invest in a (dealer fitted) add-on memory board. This gives you a 32K buffer and the option of adding font chips which cost only about £10 and include fascinating options such as a bar code print style. The P5 and P9 ranges allow plug-in font cartridges and other niceties such as dual bin sheet feeders but are very much more expensive.

The P6 is extremely quiet in normal operation, one of its strongest points, and has a special button on the front panel which makes it even quieter at the expense of some print speed.

The other front panel options are very good for controlling pitch and quality but not much else. One nice touch is that, if you wish, these choices can override any attempts by your software to reset the printer.

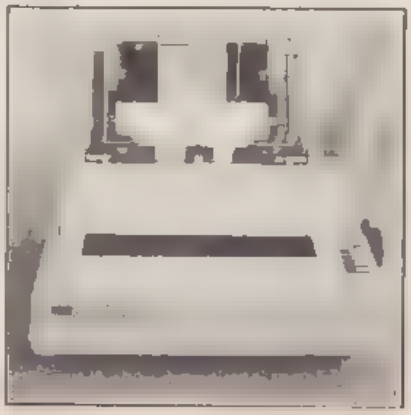
The internal font is superb in letter quality (72 cps). There is also a 'high quality draft' mode and a 'fast draft' (216 cps) – of the options you could wish for mixing and matching print styles, such as bold, italic, enlarged letter quality, are supported and look excellent.

The dip switches are fiddly to get at, and nearly as inaccessible as on the Star NB 24-10 (see below), but thankfully all options are also software selectable, including the change to the IBM character set. Notable unusual features include double height and double or triple width printing, any of which options can be mixed at will. There is an 8K buffer as standard, and 120 characters can be downloaded. Letter quality characters can fit on a matrix of up to 48 dots high by 37 dots wide.

```
This is the normal type

This is the Elite font.

Italics too!

Boldface
```

The machine is optionally Epson LQ 1500 and IBM Proprinter compatible. It is capable of graphics resolution of up to 360 × 360 dots per inch. Colour version of the P6 and the wide carriage machine, the P7, sell for about £100 more.

NEC



Printer NEC P6 **Price** £380 **Supplier** NEC, 35 Oval Road, London NW1 7EA.

Star NB 24-10

Coming in at around the £500 mark the Star NB 24-10 sets some important standards of excellence.

Star has reached new heights with its front panel control buttons. Almost everything you could wish for, page length (but, of course, no support for continuous A4), print quality, print pitch and font, can be chosen at the press of a button. The price you pay is that the remaining dip switches are deeply hidden within the recesses of the machine and only accessible by removing the ribbon.

This is unfortunate as one is very important - the IBM character set selector which appears to have no equivalent front panel or software control.

Almost every other feature you can imagine is also software selectable. Notable unusual options include double height double width, quadruple height quadruple width, overlining as well as underlining and a single character type mode which prints every character as it is sent (ie, without placing it in the buffer) and rotates the platen each time to make the print visible – like the old *World of Sport* telex machine.

The paper load controls are also excellent. There is an inbuilt bidirectional tractor which is based on a 'paper-saving' push feed system but works extremely well with no sign of any jamming. Alternatively you can use the single sheet feed-through mechanism which makes the use of A4 or headed paper easier.

An optional extra is a very competitively priced sheet feeder which remains untested, as the review machine was supplied with the model for the wide carriage NB24-15.

The print quality is superb. In draft mode it looks almost as good as the Amstrad PCW is in NLQ. The letter quality mode passes the closest inspection, and this quality is preserved across a range of print styles – bold, italic, super- and sub-script.

24-pin printers

These in turn can be mixed with each other, in pica, elite or condensed pitch and so on, in ■ there are 255 possible combinations

Optional extras include font cartridges that plug in to a slot on the front of the machine (there are two slots on the 15 inch model). They include an ORATOR font which is made up entirely of capital letters, but with true capitals larger than the others, and Letter Gothic which was my favourite

Print speeds are quoted as 216 cps draft, 72 cps letter quality.

Star NB 24-10

Up to 35 draft or letter quality downloadable characters can be remembered at once. The buffer size ■ 8K.

Graphics are capable of ■ resolution of up to 240 × 240 dots per inch, although few programs take advantage of this. The machine ■ optionally Epson LQ-1500, IBM Proprinter and IBM Graphics printer compatible.

Finally a superb manual helps, with Basic programs to demonstrate almost every feature

```
This is the standard font.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz


THIS IS THE ORATOR FONT.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ


This is the courier font.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz


This is the letter gothic font

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
```

Printer Star NB 24-10 **Price** £499
Supplier Star Micronics, Craven House, 40 Uxbridge Road, London W5.

Citizen HQP-45

Citizen's HQP-45 ■ a big beast, which can deliver fine quality printouts if you can cope with its little foibles, and indeed its sheer physical size. Organise plenty of desk space if you hope to take on this 118 × 593 × 358mm monster which weighs in at 7.5kg.

The HQP-45 features ■ 24-pin head and built-in compatibility with Epson's 24-pin machine, the LQ1000. Indeed, the HQP-45 uses the LQ1000's ribbons, which are easily obtainable

There are three print modes, selected with ■ button on the front face; draft (200cps) correspondence (132cps) and letter quality (66cps), the last of which produces such good output that it could easily be mistaken for the product of a daisywheel. Proportional spacing can also be selected for any mode

The resident font ■ Courier 10, but again this can be altered with optional font cards These are selected from another switch on the front of the printer. also found there are the line feed/form feed and on line/off line toggle switches

As you would expect from ■ device ■ this quality, a variable width tractor feed is built in. Although I found that this tends to stick unless you have the knack of pushing it ■ just the right angle, once set it's no trouble, and will cope with perforated paper up to fifteen inches wide. The HQP-45 also takes single sheets if you slide the selector on the left of the platen to FRICTION FEED.

The HQP-45 features a serial RS-232 socket on the right hand side, and parallel Centronics connector on the back. Apart from that it's remarkably free of extraneous doohickies, all the other functions are set from an array of 32 DIP switches hidden under a cover beneath the front panel.

```
IIJKLMNOPQRSTUVWXYZ[\]^_`abc
 JKLMNOPQRSTUVWXYZ[\]^_`abcd
'KLMNOPQRSTUVWXYZ[\]^_`abcde
:LMNOPQRSTUVWXYZ[\]^_`abcdef
.MNOPQRSTUVWXYZ[\]^_`abcdefg
MNOPQRSTUVWXYZ[\]^_`abcdefgh
NOPQRSTUVWXYZ[\]^_`abcdefghi
OPQRSTUVWXYZ[\]^_`abcdefghij
PQRSTUVWXYZ[\]^_`abcdefghijk
```

The range of functions available ■ almost too long to go into. You can choose the default print mode and default font (in-built or on card), set print pitch to Pica or Elite sizes, and set a number of international characters. American, British, German, French, Italian, Spanish, Swedish and Danish sets are available.

Line spacing can be set to six or eight lines per inch, and paper length to 11 or 12 inches. The paper out detector can be enabled or disabled, and an optional automatic cut sheet feeder can be activated

The interface type and serial interface parameters, automatic carriage return and bidirectionality can also be set with the DIP switches

While the speed, quality and range of function of the HQP-45 are exemplary, I found it a bit of a pain to actually load up. You have to lift the main cover and actually remove the paper cutter to get at the paper bail, which otherwise catches on the paper when the semi-automatic loader catches the paper and snatches ■ out of your hands.

The ring-bound manual does a good job of explaining Ascii codes, software control, interfacing and using the DIP switches. I have been using the HQP-45 for word-processing using an Atari 1040 ST and *First Word Plus*, and apart from the minor niggle about the fiddly loading system, have been very pleased with the printer's speed, quality and versatility

Chris Jenkins

Product *Citizen HQP-45* **Price** £795
Supplier Citizen Europe, Wellington House, 4–10 Cowley Road, Uxbridge, Middlesex UB8 2XW, 0895 72621.

Juki 7200

In certain areas, laser printers have a long way to go to catch up on established printing technology. One of their major limitations is that, because of their similarity to photocopiers, the paper has to be of appropriate size and type to fit on the toner drum. This is insurmountable without a fundamental revision of the operating design. Even though memory prices are dropping the best we can hope for is A3 size machines.

The new 24-pin machine from Juki, the 7200, costs little less than a laser printer but incorporates some important innovations that will help dot-matrix machines to hang on in there in the DTP market.

Most notably it has no platen and uses a flat bed system where the paper lays face up, and the printer head moves over it. As well as paper of any thickness it is even possible to insert card to produce high quality printed signs, calling cards, packaging and so on. It could be a taste of the things to come.

Printer Juki 7200 **Supplier** Micro-Peripherals, Intec Unit 3, Hassocks Wood, Wade Road, Basingstoke, Hants.

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THINGS THAT GO BEEP IN THE NIGHT

In this, the first article in a new series on programming sound into your routines, Kenn Garroch explains some of the features of a dedicated sound chip.

There are a number of ways of producing sound from a computer. The simplest is that used in the Spectrum, a piezo electric sounder (similar to those used in digital watches) which reacts to voltages applied to it. When the voltage changes, the shape of the sounder changes giving a click. If these clicks occur often enough then tone will be heard, and simple sound effects can be created.

By far the commonest method of producing sound from a computer is with a programmable sound generator or PSG. This is a self-contained chip that has all of the circuitry required to create tones, noises, envelopes, etc, plus the ability to do this with three or more separate voices.

The main feature of a PSG is that it is independent of the microprocessor. Once it has been instructed to do something, it does it leaving the processor to get on with more important work.

sample form, or a mathematical representation of it. The sample is obtained by measuring the volume level at successive points, and storing the values. If this is performed fast enough, the numbers are an exact representation of the sound (this method is that used by the famous Fairlight synth).

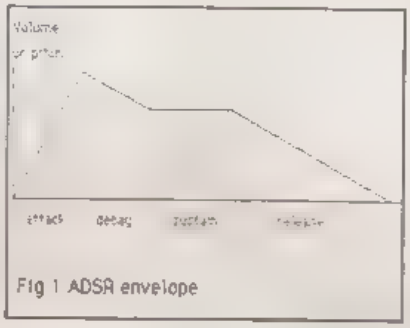

Fig 1 ADSR envelope

frequency is determined by the number of cycles that occur every second, and a cycle is defined as the time for the wave to repeat itself.

Tone or waveform – most PSG only supply square waves and noise though some will do triangles and sawtooths (see figure two).

Amplitude or volume – normally in 16 levels; 0 being off, 16 being the loudest. The amplitude is the height, or loudness of the wave.

Amplitude envelope – this determines how the volume varies with time.

Pitch envelope – how the pitch varies with time.

With these, pretty well any sound can be synthesised; certainly anything needed in a computer game such as screams, bangs, and bells.

The frequency and wave shape are determined by the facilities available on the

The capabilities of PSGs varies quite a lot, and what seem to be quite sophisticated microcomputers often have rather Basic sound generators. One of the more complex PSGs is SID in the C64, which has programmable envelopes (see figure one) for each of the three voices, built in filters, plus all of the usual noise and tone generators.

Tone channels

Probably the commonest PSG chip used in home computers is the Yamaha YM2149 (also called the AY-3-8190/1/2). This contains good examples of the general facilities available on a PSG. It has three tone channels, each having independent pitch (4096 tones), a noise channel with 64 different pitches, a mixer that allows the various channels to be switched on and off, an overall volume control, and 10 envelope shapes.

The possible sounds that are available are limited more by programming than by the chip's inherent capabilities. For instance, it is possible to use a sound chip to reproduce sampled sound but only at the expense of using up a lot of processor time.

The most sophisticated of sound reproduction available on computers is the DAC method. Here, a sound is stored in its

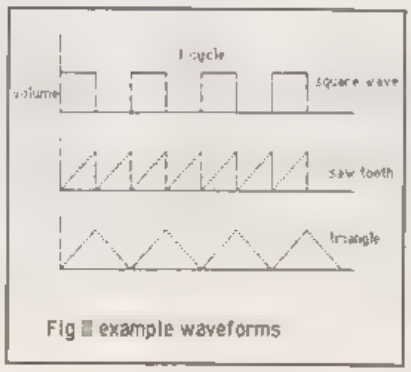

Fig 2 example waveforms

To play the sound back, the numbers are simply converted back to voltages giving a near perfect rendition of the original. Computers that use this method need to have pretty fast processors, and only the newer 16/32 bit machines are really capable of doing this well (ST, Mac, Archimedes, etc).

Frequency

To go back to the PSG method, most sounds can be created by using the chip's facilities in the right way. A sound is made up of the following:

Frequency or pitch – usually from 20–20000Hz (human hearing range). The

sound chip and so cannot be changed very much. The envelopes are a different case. Most Basics provide sound facilities for volume and pitch envelopes by changing the volume and pitch registers as the note is played.

Attack and decay

An envelope is usually defined as having four periods: attack, decay, sustain, and release. The attack is the time taken for the sound to reach its maximum (pitch or amplitude). From here, the note decays until it reaches the sustain level at which it remains for the sustain time period, after this it goes into the release stage (see figure one).

Simple envelopes need only have attack and decay since the sustain and release stages are not always needed. The different sounds possible with amplitude envelopes include bells and dings where the attack is zero, ie, the sound starts decaying straight away, or waves on the shore where the attack is long. A little experimentation soon reveals what is possible.

Kenn Garroch continues this series next week, with more on putting your sound chip to work.

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Graphics in 3D

Francis Botto looks at some of the principles behind the creation of 3D graphics.

To present graphic images which emulate visions of the real world, we have no option but to exploit 3D computer graphics. And with this added dimension computer graphics can be transformed into a more authentic visual medium creating the illusion that the TV or monitor is something more than just a flat screen.

If you have ever picked up a book on CAD or computer graphics, you'll have probably been confronted by a chapter on matrix theory, explaining all about matrix arithmetic and manipulation. But really, the only operation you need be aware of is matrix multiplication – with which you can write reasonable graphics or CAD-type programs.

Let's first consider the multiplication of two matrices:

$$\begin{bmatrix} \text{first matrix} \\ a_{11} \quad a_{12} \\ a_{21} \quad \blacksquare \end{bmatrix} \cdot \begin{bmatrix} \text{second matrix} \\ \blacksquare \quad b_{12} \\ b_{21} \quad b_{22} \end{bmatrix}$$

$$\begin{bmatrix} (a_{11} * b_{11} + a_{12} * b_{21}) \\ (a_{21} * b_{11} + \blacksquare * b_{21}) \end{bmatrix} \begin{bmatrix} (a_{11} * b_{12} + a_{12} * b_{22}) \\ (a_{21} * b_{12} + a_{22} * b_{22}) \end{bmatrix}$$

Of course, using symbols, the operation can be a little off putting – but you will see it is simply a matter of multiplying each row of the first matrix with the columns of the second.

Conveniently, the condition which must be satisfied for matrix multiplication to take place, namely, that the first matrix must possess the same number of columns as the second matrix has rows, allows us to multiply a matrix containing a theoretically infinite number of elements, using a simple 2*2 matrix, like the previous 'second matrix'. For example,

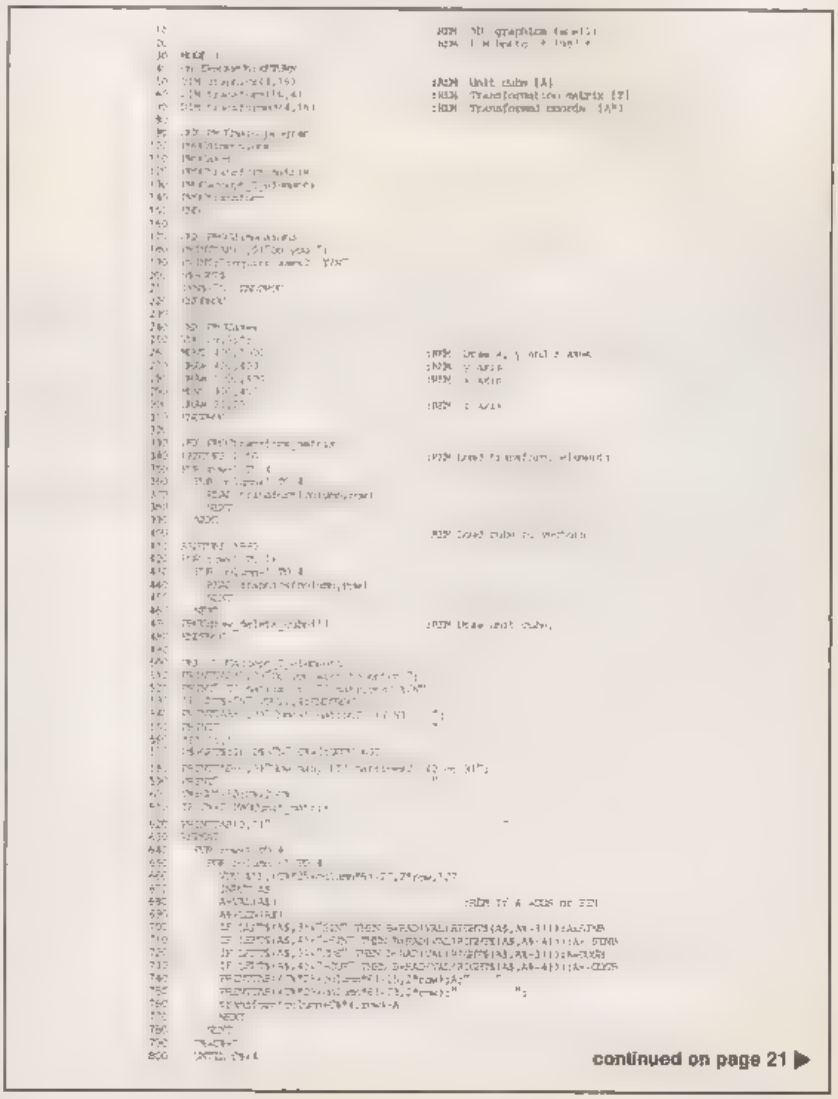
first matrix		transformation matrix		transformed matrix	
1	2	0	1	■	1
2	1	1	■	1	2
2	4			4	2
2	3			3	2

If, for instance, the first matrix contained a number of x,y coordinates, we could transform them using a 2*2 transformation matrix as shown. Which would in turn give us a tranformed set of coordinates – in other words we could manipulate a graphical shape according to requirements.

Exploiting the full potential of 3D graphics leads us to the elementary matrix ideas above. And we shall adopt homogenous coordinates from the start, so that our 3D coordinate, x,y,z, in actual fact becomes four dimensional – x,y,z,h. Nevertheless, we are still dealing with three dimensions in terms of graphics.

In a homogenous coordinate system, an (x,y) coordinate, in 2D graphics, is represented as (x,y,h), where h, the third dimension will be an arbitrary number. Otherwise, pure translation, or moving the shape in the x or y direction, is an impossible task.

The process naturally becomes a little more involved – in fact, the amount of arithmetic required is quadrupled. However the process stays exactly the same, and just to prove it, figure one shows a 3D transformation using homogenous coordinates. Once again, the 'rows times co-



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lumns' mechanism is applied, giving rise to the transformation of the unit cube – the tranformation being an axonometric projection. And curiously, this type of transformation can be used to convert 3D images into 2D presentations – but more important, a frontal view can be created in this manner.

Talking about converting 3D points into 2D points, perhaps manifests a slight problem. For most basic interpreters generate graphics shapes using 2D points (or coordinates). So purely for plotting purposes, 3D graphics programs must facilitate the tranformation of 3D into 2D points. And this may be achieved simply as follows, where an (x,y,z) point is plotted in two dimensions as (x−y/2, y−z/2). This simple conversion provides surprisingly authentic results.

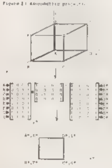
To illustrate the idea of 3D transformation, listing one demonstrates the unit cube manipulation shown in figure one. And just to show some 3D rotations the program repeatedly transforms the cube – if, that is, you don't press the space bar which causes a halt. As before, the program allows you to enter your own transformation matrices, and just for interest's sake, here are two examples:

$$\begin{bmatrix} \cos 10 & \sin 10 & 0 & 0 \\ -\sin 10 & \cos 10 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

causes rotation, in 10 degree steps,

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

results in the transformation shown in figure 1.



Lastly, if you run the program, you will be asked if you require concatenation. This is simply a term applied to a number of transformation matrices multiplied together, in order to produce a collective transformation. This is, in fact, a much used technique for providing a number of transformations – as opposed to tranforming a point more than once, which, by the way, requires vastly more computations.

The program was written on a BBC micro, but without too many specific commands, so it should be fairly easily converted.

◀ continued from page 19

```
 810                                         REM Read T2 elements into T
 820                                         REM in case concatenation
 830                                         REM is not required.
 840 FOR column=1 TO 4
 850   FOR row=1 TO 4
 860     transform(column, row)=transform(column+12,row)
 870     NEXT:NEXT
 880 IF C$="N" VDU7,4:ENDPROC
 890                                         REM Concat_unation follows:
 900                                         REM Multiply T" by T2
 910                                         REM and store result in T
 920                                         REM , the first 4 columns of
 930                                         REM transform( ) matrix.
 940 FOR row=1 TO 4
 950   FOR column=1 TO 4
 960     FOR rowcol=1 TO 4
 970       result=transform(rowcol+4,row)*transform(column+8,rowcol)+result
 980       NEXT
 990     transformed(column,row)=result
1000     result=0
1010     NEXT:NEXT
1020                                         REM Transfer [T1] [T2] product
1030                                         REM to transform [  ],
1040                                         REM in case only two matrices
1050                                         REM are entered.
1060 FOR row=1 TO 4
1070   FOR column=1 TO 4
1080     transform(column, row)=transformed(column,row)
1090     NEXT:NEXT
1100                                         REM Multiply product by
1110                                         REM stored in transformed by
1120                                         REM T3 elements stored in
1130                                         REM last 4 columns of transform.
1140 FOR row=1 TO 4
1150   FOR column=1 TO 4
1160     FOR rowcol=1 TO 4
1170       result=transformed(rowcol,row)*transform(column+12,rowcol)+result
1180       NEXT
1190     transform(column,row)=result
1200     result=0
1210     NEXT:NEXT
1220 PRINTTAB(3,12);"*"
1230 FOR column=10 TO 40 STEP 10
1240   FOR row=14 TO 20 STEP 2
1250     PRINTTAB(column,row)transform(column/10,(row-12)/2);
1260     PRINTTAB(column+8,row);"        "
1270     NEXT:NEXT
1280 PRINTTAB( [illegible] )"Space bar"
1290 REPEAT:UNTIL INKEY(-99)
1300 VDU23,4
1310 PROCdraw_delete_cube(1)
1320 ENDPROC
1330
1340 DEF PROCtransform
1350 PRINTTAB(0,0);"                              ";
1360 PRINT
1370 FOR row=1 TO 16                         :REM Multiplication transformation
1380   FOR column=1 TO 4
1390     FOR rowcol=1 TO 4
1400       result=graphics(rowcol,row)*transform(column,rowcol)+result
1410       NEXT
1420     transformed(column,row)=result
1430     result=0
1440     NEXT:NEXT
1450 PROCdraw_delete_cube(0)
1460                                         REM Read transd( ) into graphs( )
1470 FOR row=1 TO 16
1480   FOR column=1 TO 4
1490     graphics(column,row)=transformed(column,row)
1500     NEXT
1510   NEXT
1520 PROCdraw_delete_cube(1)
1530 [illegible]
1540 [illegible]
1550   [illegible] IF [illegible] GOTO 1540
1560   [illegible]
1570   [illegible]
1580
1590 DEF PROCdraw_delete_cube(colour)
1600 VDU29,400;400;                          REM Move origin to 400,400
1610 [illegible]
1620 REPEAT:UNTIL NOT INKEY(-99)
1630 MOVE (graphics(1,1)-graphics(3,1)/2)*200, (graphics(2,1)-graphics(3,1)/2)
1640
1650 FOR row=1 TO 16
1660                                         REM Convert 4D vectors to 2D
1670                                         REM for plotting purposes
1680   [illegible]
1690   [illegible]
1700   [illegible]
1710                                         REM restore graphics elements
1720   graphics(1,row)=graphics(1,row)+graphics(3,row)/2
1730   graphics(2,row)=graphics(2,row)+graphics(3,row)/2
1740   NEXT row
1750 ENDPROC
1760
1770 DEF PROCunit_matrix
1780                                         REM Nested into PROCconcat.
1790                                         REM [T] elements:
1800                                          REM  1  0  0  0
1810 FOR column=1 TO 4                       :REM  0  1  0  0
1820   FOR row=1 TO 4                        :REM  0  0  1  0
1830     transform(column+4,row)=0           :REM  0  0  0  1
1840     IF column=row transform(column+4,row)=1
1850     NEXT:NEXT
1860 ENDPROC
1870
1880 REM  x,  y,  z,  h.
1890 DATA 0,  0,  0,  1 :REM A               Cube coords.
1900 DATA 0,  0,  1,  1 :REM B               See figure 1
1910 DATA 1,  0,  1,  1 :REM C
1920 DATA 1,  0,  0,  1 :REM D
1930 DATA 0,  0,  0,  1 :REM A
1940 DATA 0,  1,  0,  1 :REM E
1950 DATA 0,  1,  1,  1 :REM F
1960 DATA 1,  1,  1,  1 :REM G
1970 DATA 1,  1,  0,  1 :REM H
1980 DATA 0,  1,  0,  1 :REM E
1990 DATA 0,  1,  1,  1 :REM F
2000 DATA 0,  0,  1,  1 :REM B
2010 DATA 1,  0,  1,  1 :REM C
2020 DATA 1,  1,  1,  1 :REM G
2030 DATA 1,  1,  0,  1 :REM H
2040 DATA 1,  0,  0,  1 :REM D
2050
2060 DATA  .996,  .087,   0,   0  REM Default [T] elements.
2070 DATA -.087,  .996,   0,   0  REM 5 degree rotation about
2080 DATA  0,     0,      1,   0  REM z axis.
2090 DATA  0,     0,      0,   1
>
```

Custom RSX Manager

Simon T Goodwin

This week features the second and concluding part of the program that will enable you to build up a database of RSX commands.

The whole database can be viewed using the View RSX Database option. Using the cursor keys and the Copy keys RSX's can be switched on or switched off. Any RSX that is switched on will be included in the custom RSX extension that is created by the Save Custom RSX Table routine. This option creates a file containing the RSX's that have been switched on. Do not worry about the screen corruption whilst the routine is running. The machine code is located at memory address 16384. The custom RSX file can be loaded and executed independently of the database using the following short program:

```
10 MEMORY 16383
20 LOAD "filename", 16384
30 CALL 16384
40 NEW
```

The whole database can be loaded and saved to disc or tape using the Load RSX Database and Save RSX Database options.

So for example to place XEN commands in the database, load a binary file containing the XEN file using the Load Machine Code Data option and then use the Store RSX Routine option to place the commands you want into the database (eg. RSCROLL is located at 41629 and is nine bytes long). Then use the View RSX Database Option to switch on the required commands. Then, either the whole database can be saved for future use, or the custom RSX table can be saved independently.

Finding out whether a particular RSX is compatible with this program may be a case of trial and error. It is worth bearing in mind that some RSX's are fundamentally incompatible with others even though they are relocatable. The |HEADER and |SHIFTCLS commands from my XEN program are good examples. To help beginners I have compiled a list of all my RSX commands that have been published in PCW together with the memory address and length of each individual routine. Readers can obtain this by sending me an SAE. In addition I will provide the program on tape or disc for £3 and £5.50 respectively. The address is 41 Fountains Drive, Acklam, Middlesbrough, Cleveland, TS5 7LW.

```
4000 REM Hex dump of routine
4005 found=0
4010 CLS
4015 FOR n=1 TO 255:CALL &BB1B:NEXT
4020 INPUT "Name of RSX:",n$
4025 n$=UPPER$(n$)
4030 FOR n=1 TO 100
4032 IF n$=MID$(name$(n),1,LEN(n$)) AND
n$<>"" THEN found=n
4034 NEXT
4035 IF found=0 THEN PRINT "No such RSX"
:GOTO 4070
4036 LOCATE 1,2:PRINT name$(found);"
Address ";addr(found);"  Length ";lengt
h(found)
4038 PRINT
4039 CALL 12521,4
4040 FOR n=addr(found) TO addr(found)+le
ngth(found)-1
4050 PRINT HEX$(PEEK(n));",";
4060 NEXT
4065 CALL 12521,0
4070 PRINT:PRINT:GOSUB 500
4080 RETURN
4100 END
4997 :
4998 :
4999 :
5000 REM Create custom RSX table
5010 CLS
5020 FOR n=1 TO 100:PAPER 1:PEN 0:PRINT
name$(n)+STRING$(15-LEN(name$(n)),"
");:
IF flag(n)=1 THEN PRINT CHR$(6);"*";
5022 PAPER 0:PEN 1:PRINT " ";:NEXT
5030 PRINT:PRINT:
5035 PAPER 1:PEN 0
5040 PRINT "Use cursor keys to move and
COPY to select or de-select an RSX.@ ret
urns to menu";
5045 PAPER 0:PEN 1
5046 PRINT CHR$(23);CHR$(1):TAG
5047 locx=1:locy=1:GOSUB 800
5050 WHILE INKEY(9)
5051 IF INKEY(67)=0 THEN 5090
5055 IF INKEY(1)=0 AND locx<5 THEN GOSUB
 800:locx=locx+1:GOSUB 800
5056 IF INKEY(8)=0 AND locx>1 THEN GOSUB
 800:locx=locx-1:GOSUB 800
5058 IF INKEY(0)=0 AND locy>1 THEN GOSUB
 800:locy=locy-1:GOSUB 800
5059 IF INKEY(2)=0 AND locy<20 THEN GOSU
B 800:locy=locy+1:GOSUB 800
5060 WEND
5070 use=((locy*5)-5)+locx:
5071 IF flag(use)=0 THEN flag(use)=1:MOV
E (128*locx)-16,398-(locy*16)+16:PRINT "
*";:ELSE IF flag(use)=1 THEN flag(use)=0
:MOVE (128*locx)-16,398-(locy*16)+16:PRI
NT "*";
5073 FOR n=1 TO 100:NEXT
5080 GOTO 5050
5090 TAGOFF:PRINT CHR$(23);CHR$(0)
5100 RETURN
5997 :
5998 :
5999 :
6000 REM Catalogue
6010 CLS:CAT
6020 PRINT:PRINT:GOSUB 500:RETURN
6997 :
6998 :
6999 :
7000 REM Exit
7005 CLS
7010 GOSUB 600
7020 IF INKEY(43)=0 THEN END
7030 IF INKEY(46)=0 THEN RETURN
7040 END
7997 :
7998 :
7999 :
8000 REM Load RSX database
8005 CLS
8020 FOR n=1 TO 255:CALL &BB1B:NEXT
8030 INPUT "Filename ",f$
8033 OPENIN f$
8040 INPUT #9,mak
8046 FOR n=1 TO mak+1
8047 INPUT #9,name$(n),addr(n),length(n)
,flag(n)
8050 NEXT
8055 INPUT #9,marker
8060 CALL 12521,4
8070 FOR n=16384 TO marker+1
8080 INPUT #9,a:POKE n,a
8090 NEXT
8100 CALL 12521,0
8110 CLOSEIN
8120 RETURN
8497 :
8498 :
8499 :
8500 REM Save RSX database
8505 CLS
8520 FOR n=1 TO 255:CALL &BB1B:NEXT
8530 INPUT "Filename ",f$
8535 OPENOUT f$
8545 WRITE #9,mak
8546 FOR n=1 TO mak+1
8547 WRITE #9,name$(n),addr(n),length(n)
,flag(n)
8550 NEXT
8556 WRITE #9,marker
8560 CALL 12521,4
8570 FOR n=16384 TO marker+1
8580 WRITE #9,PEEK(n)
8590 NEXT
8600 CALL 12521,0
8610 CLOSEOUT
8620 RETURN
8997 :
8998 :
8999 :
9000 FOR n=12500 TO 12530
9010 READ a$:POKE n,VAL("&"+a$)
9020 NEXT
9025 REM call 12500,shift
9026 REM call 12521,bankswitch
9030 RETURN
9100 DATA DD,6E,4,DD,66,5,DD,5E,2,DD,56,
3,DD,4E,0,DD,46,1,ED,B0,C9,DD,7E,0,CD,5B
,BD,C9,0,0,0
9110 :
9120 :
9130 :
```

ADS

Adam Newby

Part two of the ADS, assembler and disassembler, system is presented this week. The concluding episode can be seen at the same time next week, but for now, on with the instructions.

2 – Define labels. Selecting this option allows you to assign a value or a location of a line to a word, which can be used in programs as an operand. If you select option one (assign a value), then every time that label is used, it will be converted into the value specified. If you select option two (assign the address of a line), then the value representing the address of a line of your program is given to the label. This is meant primarily for use with the 'BYTE and 'WORD functions, so that you can store numbers, and use the values in them.

3 – Rewrite a line. Selecting this option will allow you to change a specified line. The line number will be displayed. Type in the instruction, press Return, then type the operand and press Return again. The new line will be entered into the program.

4 – Insert a line. This function allows you to insert a new line before another one. When prompted by the computer, type in the number of the line before which you want to insert a new line, and the line number of the new line. This will be displayed. As before, type the instruction, press Return, then type the operand, and press Return. The new line will be inserted.

5 – Delete a line. This will remove from the program the line you specify.

6 – List program. This displays the program, labels and start and end addresses, if it has been assembled.

7 – Assemble. This will assemble the program from the start address you specify onwards. The assembly is in two passes: the main program is assembled in pass one and jumps, branches and labels are assembled in pass two.

8 – Run program. This does an X=USR (start address) for running programs which do not need any parameters to be passed and will run from and return to Basic.

9 – Return to main menu. This displays the assembler/disassembler selection page. Your program is retained in memory.

S – Save source data. This saves the data for your program as it was typed in (in assembly language).

X – Save assembled program. This will save the current program, or one at a specified location as assembled code.

L – Load source data. This will load from cassette the data for an assembled program. Note the start and end addresses down after it loads.

B – Create boot loader. This converts either the currently assembled program or one at a specified location into a form which will load and auto-run when you switch on the computer and hold down START.

```
460 IF ADDR+2-MEMPO(N)<=0 THEN POKE ADDR+1,MEMPO(N)-(ADDR+2):ADDR=ADDR+2:RETURN
470 POKE ADDR+1,128+128-(ADDR+2-MEMPO(N)):ADDR=ADDR+2:RETURN
480 IF CMD$="JMP___" OR CMD$="JSR___" THEN ADDR=ADDR+3:RETURN
490 ADDR=ADDR+2:RETURN
491 ? APLN$(IDP*6,IDP*6+5);" ";APP$(IDP*6,IDP*6+5);" ";AD$(IDP*6,IDP*6+5):RETURN
492 IF IAD$<>" " AND IAD$<>"$" THEN IF IAD$<"0" OR IAD$>"9" THEN GOSUB 3000:RETU
RN
493 IF IAD$<>" " AND IAD$<>"$" THEN V=VAL(AD$(IDP*6,IDP*6+5))
494 RETURN
495 POKE ADDR,76:POKE ADDR+1,V-256*INT(V/256):POKE ADDR+2,INT(V/256)
496 ? APLN$(IDP*6,IDP*6+5);" JMPOUT [illegible] ADDR=ADDR+3:IDP=IDP+1:R
ETURN
497 POKE ADDR,32:POKE ADDR+1,V-256*INT(V/256):POKE ADDR+2,INT(V/256)
498 ? APLN$(IDP*6,IDP*6+5);" JSROUT ";AD$(IDP*6,IDP*6+5) [illegible] IDP=IDP+1:R
ETURN
499 ? APLN$(IDP*6,IDP*6+5);" WORD. ";AD$(IDP*6,IDP*6+5):RETURN
500 IF PASS=1 THEN ? [illegible] GOSUB 600
505 IF LPASS=1 THEN ? "Pass 2 line address labels.":? :LPFLG=1:GOSUB 700
507 IF ST$(1,1)="$" THEN DEC=ADDR:GOSUB 800:EN$=HEX$:GOTO 510
508 EN$=STR$(ADDR)
510 ? "Assembly completed.":AFLG=1:? "End address - ";EN$
515 [illegible] "Pre[illegible] 1 to write new program":? "2 to define label
[illegible] 3 to rewrite a line."
516 ? "4 to insert a line.":? "5 to delete a line":? "6 to list program.":?
"7 to assemble program."
517 ? "8 to run program.":? "9 to return to main [illegible]" [illegible] to save source d
ata"
518 ? "X to save assembled program.":? "L to load source program.":? "B to lo
ad assembled program."
519 ? "B to create boot loader."
520 [illegible] INKEY$=CHR$(C)
524 IF INKEY$="1" THEN ? :GOTO 200
525 IF INKEY$="2" THEN GOTO [illegible]
527 IF INKEY$="[illegible]" THEN [illegible]
528 IF INKEY$="[illegible]" THEN [illegible]
530 IF INKEY$="[illegible]" THEN 1000
531 IF INKEY$="[illegible]" THEN [illegible]
532 IF INKEY$="[illegible]" THEN 1000
533 IF INKEY$="[illegible]" THEN 4000
534 IF INKEY$="[illegible]" THEN [illegible]
535 IF INKEY$="4" THEN [illegible]
536 IF INKEY$="[illegible]" THEN [illegible]
537 IF INKEY$="[illegible]" THEN [illegible]
538 IF INKEY$="[illegible]" THEN 300
539 IF INKEY$="8" THEN 550
540 GOTO 523
550 IF AFLG=0 THEN ? "Program not yet assembled.":GOTO 515
560 X=USR(STADDR):? "Program run.":GOTO 515
590 OPEN #1,4,0,"K:":GOTO 520
600 FOR A=6 TO IP*6
610 IF APP$(A,A+5)="JMP___" OR APP$(A,A)="B" AND APP$(A+1,A+1)<>"I" AND APP$(A+1
,A+1)<>"R" THEN GOSUB 640
615 IF APP$(A,A+5)="JSR___" THEN GOSUB 640
620 NEXT A
630 RETURN
640 IDP=A/6:ADDR=MEMPO(IDP):CMD$=APP$(A,A+5)
650 ? APLN$(A,A+5);" ";APP$(A,A+5);" ";AD$(A,A+5):GOSUB 430:RETURN
700 FOR Y=1 TO NAD
710 IF LT(Y)=1 THEN GOSUB 740
720 NEXT Y
730 RETURN
740 LA$=AOD$(Y*6,Y*6+5)
750 FOR Z=6 TO IP*6
760 IF AD$(Z,Z+5)=LA$ THEN IDP=Z/6:ADDR=MEMPO(IDP):GOSUB 330
770 NEXT Z
```

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◀ continued from page 24

```
780 RETURN
800 IF DP=0 THEN ? "Program not yet written." GOTO 515
802 A=0 ?
805 FOR N=1 TO DP
810 ? APLN$(N*6-N*6+5);" ";APR$(N*6-N*6+5);" ";AO$(N*6,N*6+5)
820 IF PEEK(764)=28 THEN POKE 764,255 GOTO 515
825 A=A+1 IF A=23 THEN GET #1,C A=0
830 NEXT N
835 ?
840 IF NAO=0 THEN ? ? "No labels."
850 IF NAO>0 THEN GOSUB 900
860 IF AFLG=0 THEN ? ? "Program not yet assembled." GET #1,C GOTO 515
870 ? ? "Start address = ";ST$ "End address = ";EN$ GET #1,C GOTO 515
900 FOR N=1 TO NAO
910 ? AOD$(N*6-N*6+5);" = "
920 IF LT(N)=1 THEN ? "Line
930 ? AOV$(N*6-N*6+5)
940 NEXT N
950 RETURN
1000 IF DP=N-1 THEN ? "No room for line." GOTO 515
1005 ? ? "Insert before which line"; INPUT DES$ IF LEN(DES$)<>6 THEN FOR I=LEN(
ES$)+1 TO 6 DES$(I,N)=" " NEXT N
1007 ? ? "What line do you wish to insert"; INPUT LI$ IF LEN(LI$)<>6 THEN FOR I=
LEN(LI$)+1 TO 6 LI$(I,N)=" " NEXT N
1008 ROW=PEEK(84) IF ROW=23 THEN ? POSITION 2,22
1010 ? LI$;" ";:ROW=PEEK(84):INPUT CMD$
1020 IF LEN(CMD$)<6 THEN CMD$=CMD$(1,6)+SS(1,6-LEN(CMD$))
1025 POSITION 16,ROW:INPUT O$ IF LEN(O$)<6 AND O$<>"" THEN FOR N=LEN(O$)+1 TO 6
O$(N)=" " NEXT N
1027 IF O$="" THEN O$="      "
1030 FOR N=1 TO DP IF APLN$(N*6-N*6+5)=DES$ THEN 1050
1040 NEXT N
1050 FOR N=DP TO N STEP -1:APLN$(N*6+1,N*6+5)=APLN$(N*6,N*6+5):APR$(N*6+1,N*6+
5)=APR$(N*6,N*6+5)
1055 AO$(N*6+1,N*6+5)=AO$(N*6,N*6+5):NEXT N
1060 APLN$(N*6,N*6+5)=LI$:APR$(N*6,N*6+5)=CMD$:AO$(N*6,N*6+5)=O$
1070 DP=DP+1:AFLG=0 GOTO 515
1100 ? ? "Line". INPUT DES$ IF LEN(DES$)<6 THEN FOR N=LEN(DES$)+1 TO 6 DES$(N,N
)=" " NEXT N
1105 ROW=PEEK(84) IF ROW=23 THEN ? :POSITION 2,22
1110 FOR N=1 TO DP:IF APLN$(N*6-N*6+5)=DES$ THEN 1130
1120 NEXT N
1125 ? "Line does not exist." GOTO 515
1130 FOR M=N TO DP-1:APLN$(M*6-M*6+5)=APLN$(M+1*6-M+1*6+5):APR$(M*6-M*6+5)=A
PR$(M+1*6-M+1*6+5)
1135 AO$(M*6-M*6+5)=AO$(M+1*6-M+1*6+5):NEXT M
1140 DP=DP-1:AFLG=0
1150 GOTO 515
1200 ? :? "Line", INPUT DES$ IF LEN(DES$)<6 THEN FOR N=LEN(DES$)+1 TO 6 DES$(N)=
" " NEXT N
1205 ROW=PEEK(84) IF ROW=23 THEN ? :POSITION 2,22
1210 ? DES$;" ";:ROW=PEEK(84):INPUT CMD$
1220 IF LEN(CMD$)<6 THEN CMD$=CMD$(1,6)+SS(1,6-LEN(CMD$))
1225 POSITION 16,ROW:INPUT O$ IF LEN(O$)<6 AND O$<>"" THEN FOR N=LEN(O$)+1 TO 6
O$(N)=" " NEXT N
1227 IF O$="" THEN O$="      "
1230 FOR N=1 TO DP IF APLN$(N*6-N*6+5)=DES$ THEN 1250
1240 NEXT N
1245 ? "Line does not exist." GOTO 515
1250 APR$(N*6-N*6+5)=CMD$:AO$(N*6-N*6+5)=O$
1260 AFLG=0 GOTO 515
1300 IF NAO=NALB THEN ? "No more room for labels." GOTO 515
1310 ? :? "Label", INPUT LA$ IF LEN(LA$)<6 THEN FOR N=LEN(LA$)+1 TO 6 LA$(N,N)="
" NEXT N
1315 ? :? "Press 1 or 2 ":? "1 to assign a value ":? "2 to assign an address of a li
ne."
1316 GET #1,C:INKEY$=CHR$(C)
1317 IF INKEY$="1" THEN GOTO 1320
1318 IF INKEY$="2" THEN GOTO 1350
1319 GOTO 1316
1320 ? :? "Value for label" INPUT A$ IF LEN(A$)<6 THEN FOR N=LEN(A$)+1 TO 6 A$(
N)=" " NEXT N
1325 IF LEN(LA$)<6 THEN FOR N=LEN(LA$)+1 TO 6 LA$(N)=" " NEXT N
1330 NAO=NAO+1:AOD$(NAO*6-NAO*6+5)=LA$:AOV$(NAO*6-NAO*6+5)=A$:LT(NAO)=0
1340 GOTO 515
1350 ? :? "Line":INPUT DES$ IF LEN(DES$)<6 THEN FOR N=LEN(DES$)+1 TO 6 DES$(N)=
" " NEXT N
1360 FOR I=1 TO DP
1370 IF APLN$(N*6-N*6+5)=DES$ THEN 1390
1380 NEXT N
1385 ? "Line does not exist." GOTO 515
1390 NAO=NAO+1:AOD$(NAO*6-NAO*6+5)=LA$:AOV$(NAO*6-NAO*6+5)=DES$:LT(NAO)=1 GOTO
515
2000 OPEN #1,4,0,"K:" GOTO 62
2010 OPEN #1,4,0,"K:" GOTO 56
3000 IF NAO=0 THEN ? "No labels defined." GOTO 515
3010 FOR N=6 TO NAO*6 STEP 6
3020 IF AOD$(N,N+5)=AO$(IDP*6-IDP*6+5) THEN GOTO 3040
3030 NEXT N
3035 ? "Undefined label in line ";APLN$(IDP*6-IDP*6+5):GOTO 515
3040 AODP=N-6
3042 IF LT(AODP)=1 THEN 3100
3050 IF AOV$(AODP*6,AODP*6+5)="$" THEN HEX$=AOV$(AODP*6,AODP*6+5):GOSUB 7000:RET
URN
3060 V=VAL(AOV$(AODP*6,AODP*6+5))
3070 RETURN
3100 FOR A=6 TO DP*6
3110 IF APLN$(A-A+5)=AOV$(AODP*6-AODP*6+5) THEN GOTO 3130
3120 NEXT A
```

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```
3125 ? "Label referring to nonexistent line   in line " APLN$(DP*6,DP*6+5):GOT
O 515
3130 LR=A+5
3140 IF LR IOF AND LPFLG=0 THEN LPASI=1 RETURN
3150 V=MEMPOK(LR)
3160 RETURN
4000 IF OP=0 THEN ? "Program not yet written." GOTO 515
4005 ? "Press play & record on tape recorder  wait for the Beep then Press retu
rn."
4010 CLOSE #1 OPEN #1.8.0 "C:"
4020 PUT #1.DP PUT #1.NAO
4030 FOR N=6 TO DP*6+5
4040 PUT #1.ASC(APLN$(N,N))
4050 NEXT N
4060 FOR N=6 TO DP*6+5
4070 PUT #1.ASC(APP$(N,N))
4080 NEXT N
4090 FOR N=6 TO DP*6+5
4100 PUT #1.ASC(AO$(N,N))
4110 NEXT N
4115 IF NAO=0 THEN CLOSE #1 ? "Save completed." SOUND 0,0,0,0 GOTO 515
4120 FOR N=6 TO NAO*6+5
4130 PUT #1.ASC(AOD$(N,N))
4140 NEXT N
4150 FOR N=6 TO NAO*6+5
4160 PUT #1.ASC(AODV$(N,N))
4170 NEXT N
4180 FOR N=1 TO NAO
4190 PUT #1,LT(N)
4200 NEXT N
4210 CLOSE #1:? "Save completed." SOUND 0,0,0 0 GOTO 515
4300 ? "Press play on tape recorder wait for  the beep then Press return."
4310 CLOSE #1 OPEN #1 4.0 "C:"
```

PROGRAMMING: BBC B

Sprite Animator

Tim Fox

The concluding section of the program is presented this week. To use the sprite in your own programs add listing 3 to your program and at the beginning add *LOAD SPRITE and *LOAD SPRx (where x is the number one to nine). The sprite can now be animated simply by using the command PROC animate (width, height, Xstart, Ystart, Xincrement, Yincrement, Xstop, Ystop).

Animation takes place on a mode 2 screen and if at any time the sprite co-ordinates matches Xstop or Ystop, the sprite stops. Locations &85 and &86 hold the address of the sprite data, so if you want to switch images, poke this area.

Listing 3

```
1REM procedure to incorporate in
2REM your own programs
3REM by Tim Fox
4:
10DEFPROCanimate(W%,?&82,X%,Y%,?&7E,?&80,?&7F,?&81)
11REM amount of bytes in X direction is half the amount of pixels
20?&83=W%/2
21REM high byte & low byte of address of start of sprite data
30?&86=9
40?&85=0
41REM if the sprite is over a certain size then reduce flicker
50IF(W%*?&82)>=500 THEN?&84=255
60IF(W%*?&82)<500 THEN?&84=0
61REM call the animation routine
70CALL &C00
80ENDPROC
```

Main Listing

```
480DEFPROCyround
490IF(YU% MOD4<>0 AND((YU% MOD4)/4 <=.5)) THEN YU%=4*(YU%/4-(YU% MOD4)/4)
500IF(YU% MOD4<>0 AND((YU% MOD4)/4>.5)) THEN YU%=4*(YU%/4+(1-(YU% MOD4)/4))
510ENDPROC
520DEFPROCpoint(col)
530?(&1900+X*Y%+Y)=col
540GCOL0,col
550PROCblotch
560ENDPROC
570DEFPROCblotch
580MOVEX*XU%+8,Y*YU%+4
590MOVE(X+1)*XU%-8,Y*YU%+4
600PLOT85,X*XU%+8,(Y+1)*YU%-4
610PLOT85,(X+1)*XU%-8,(Y+1)*YU%-4
620ENDPROC
630DEFPROCcursor
640GCOL3,9
650PROCblotch
660ENDPROC
670DEFPROCvert
680G=GET:IFNOT((G>47 ANDG<58)OR(G>64 ANDG<71))VDU7:GOTO680
690co=EVAL("&"+CHR$G)
700YY=Y
710FORY=0TOY%-1
720?(&1900+X*Y%+Y)=co
730PROCpoint(co)
740NEXT
750Y=YY
760ENDPROC
770DEFPROChoriz
780G=GET:IFNOT((G>47 ANDG<58)OR(G>64 ANDG<71)) VDU7:GOTO780
790co=EVAL("&"+CHR$G)
800XX=X
810FORX=0TOX%-1
820?(&1900+X*Y%+Y)=co
830PROCpoint(co)
840NEXT
850X=XX
860ENDPROC
870DEFPROCsave
880PROCprint
890G=GET:IFNOT(G>47 ANDG<58)VDU7:GOTO890
900OSCLI("*SAVE SPR"+CHR$G+" 900 B00")
910ENDPROC
920DEFPROCwipe
930G=GET:IFNOT((G>47 ANDG<58)OR(G>64 ANDG<71)) VDU7:GOTO930
940co=EVAL("&"+CHR$G)
950GCOL0,co
960MOVE0,0:MOVEXU%*X%,0:PLOT85,0,YU%*Y
```

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```
%:PLOT85,XU%*X%,YU%*Y%
 970GCOL0,7
 980PROCgrid
 990FORL%=0TO(X%*Y%)-1
 1000L%?&1900=co
 1010NEXT
 1020ENDPROC
 1030DEFPROCprint
 1040XX=X:YY=Y
 1050F%=&900
 1060FORX=0TOX%-1STEP2
 1070FORY=Y%-1TO0STEP-1
 1080L%=?(&1900+X*Y%+Y)
 1090L1%=?(&1900+(X+1)*Y%+Y)
 1100DATA0,1,4,5,16,17,20,21,64,65,68,69
,80,81,84,85
 1110RESTORE
 1120FORL=0TOL%:READA:NEXT:A=A*2
 1130RESTORE
 1140FORL=0TOL1%:READB:NEXT
 1150X1=65+X/2
 1160Y1=(Y%-Y)+100
 1170?(&3000+(X1*8)+&280*(Y1 DIV8)+(Y1 A
ND7))=A+B
 1180?F%=A+B
 1190F%=F%+1
 1200NEXT
 1210NEXT
 1220X=XX:Y=YY
 1230ENDPROC
 1240DEFPROChelp
 1250FL=TRUE
 1260PRINTTAB(14,2)"        ":COLOUR3:PRIN
TTAB(14,0)"Press"TAB(14,1)"Space"TAB(14,
2)"to"TAB(14,3)"move"TAB(14,4)"text"
 1270VDU28,19,31,19,0
 1280COLOUR6
 1290RESTORE1530
 1300READam:FORL=1TOam
 1310READa$:PRINT;" "a$" ";
 1320*FX15,0
 1330K=GET:NEXT
 1340CLS
 1350VDU26:COLOUR1:PRINTTAB(14,0)"Q-help
"TAB(14,1)SPC5TAB(14,2)SPC5TAB(14,3)SPC5
TAB(14,4)SPC5
 1360FL=FALSE
 1370ENDPROC
 1380DEFPROCgrid
 1390XX=X:YY=Y
 1400FORX=0TOXU%*X% STEPXU%
 1410MOVEX,0:DRAWX,YU%*Y%
 1420NEXT
 1430FORY=0TOYU%*Y% STEPYU%
 1440MOVE0,Y:DRAWXU%*X%,Y
 1450NEXT
 1460X=XX:Y=YY
 1470ENDPROC
 1480DEFPROCerr
 1490PROCpoint(0)
 1500IFFL THENCLS:VDU26
 1510FL=FALSE
 1520ENDPROC
 1530DATA85
 1540DATAPress,W,then,a,number,to,wipe,g
rid,in,chosen,colour,"","","","",Press,H
,then,a,number,to,fill,present,row,in,ch
osen,colour,"","","","",Press,V,then,a,n
umber,to,fill,present,column,in,chosen,c
olour,"","","","",Press,P,to,draw,
 1550DATAlifesize,sprite,"","","","",Pre
ss,the,appropriate,colour,number,to,fill
,present,square,"","","","",Press,approp
riate,cursors,to,move,cursor,"","","",""
,Press,S,then,a,number,to,save,sprite
```

PROGRAMMING: SPECTRUM

Catacombs

P Fox

This program, which is listed over three weeks, is a *Gauntlet* style game for up to one player! It also includes a level designer for up to twelve levels. The game and loading instructions appear next week

```
  10 CLS : PRINT AT 16,0; PAPER 2;" CATAC
OMB              BY P.FOX "
  20 PRINT AT 17,23;"LEVEL";AT 21,2;"HEAL
TH ENERGY SCORE  KEYS"
  30 POKE 65011,136: POKE 65012,19: POKE
65000,1: POKE 65001,1
  40 RANDOMIZE USR 60000
  50 CLS : LET SC=PEEK 65008+PEEK 65009*2
56+PEEK 65010*100
  60 IF PEEK 65010=11 THEN  PRINT AT 8,11
;"GAME BONUS": LET SC=SC+1000
  70 PRINT AT 10,11;"SCORE=";SC
  80 FOR C=1 TO 10: IF H(C)<SC THEN  GO T
■ 100
  90 NEXT C: GO TO 1030
 100 IF C=10 THEN  LET H(C)=SC: GO TO 120
 110 FOR D=10 TO C+1 STEP -1: LET H$(D)=H
$(D-1): LET H(D)=H(D-1): NEXT D: LET H(C)
=SC
 120 INPUT "NAME "; LINE H$(C): GO TO 112
0
 999 STOP
1000 CLEAR 45055: LOAD ""CODE : LOAD ""CO
DE : POKE 23607,231
1010 LET A$="WELCOME TO CATACOMB ■ PAUL
FOX WELCOME TO CATACOMB BY PAUL FOX ": DI
■ H$(10,10): DIM H(10)
1020 RESTORE 2000: FOR C=1 TO 10: READ H$
(C),H(C): NEXT C
1030 BORDER 0: PAPER ■ INK 7: CLS
1040 PRINT AT 12,10;"1 START GAME";AT 14,
10;"2 EDIT GAME";AT 16,10;"3 SCORE TABLE"
;AT 18,10;"4 SAVE LEVELS";AT 20,10;"5 LOA
D LEVELS"
1050 RESTORE 2010: LET C=0: LET VAR=0
1060 PRINT  PAPER 2;AT 8,0;A$(C+1 ■ C+32
): LET C=(C+1 AND C<31): READ NOTE: IF NO
TE=255 THEN  RESTORE 2010: LET VAR=(VAR+2
 AND VAR<30): READ NOTE
1070 BEEP .2,NOTE+VAR
1080 LET B$=INKEY$: IF B$="1" THEN  GO ■
 10
1090 IF B$="2" THEN  GO TO 1200
1100 IF B$="3" THEN  GO TO 1120
1105 IF B$="4" THEN  GO TO 1400
1106 IF B$="5" THEN  GO TO 1420
1110 GO ■ 1060
1120 REM HIGH SCORE TABLE
1130 CLS : PRINT AT 0,0; PAPER 2;"
 HIGH SCORE TABLE        "
1140 FOR C=1 ■ 10: PRINT AT C*2,5;H$(C);
AT C*2,23;H(C): BEEP .02,10-C: NEXT C: PA
USE 0: GO TO 1030
1200 REM GAME EDITOR
1210 CLS : INPUT "LEVEL(>11=END)";LEV: IF
 LEV>11 THEN  GO TO 1030
1220 LET X=0: LET MO=0: LET Y=0: LET GRA=
0: LET ADDR=45056+LEV*512: FOR C=0 TO 511
: POKE C+58112,PEEK (C+ADDR): NEXT C: RAN
DOMIZE USR 62000: PRINT AT 16,0; PAPER 2;
" LEVEL ADDR  X.POS Y.POS MODE   "
1230 PRINT AT 17,1;LEV;AT 17,7;ADDR;AT 17
,13;X;AT 17,19;Y;AT 17,25;"OVER"
1240 PRINT AT 19,0;: POKE 23607,246: FOR
C=32 ■ 127: PRINT CHR$ (C);: NEXT C: POK
E 23607,231
1300 LET B$=INKEY$: IF B$="0" OR B$="9" T
HEN  PRINT  OVER 1; PAPER 0;AT INT (GRA/3
2)+19,((GRA/32)-INT (GRA/32))*32;" ": LET
 GRA=GRA+(B$="0" AND GRA<95)-(B$="9" AND
GRA>0): PRINT  OVER 1; PAPER 5; INK 1;AT
INT (GRA/32)+19,((GRA/32)-INT (GRA/32))*3
2;" ": GO TO 1300
1305 IF B$=" " THEN  GO TO 1200
1310 IF B$="P" THEN  BEEP .05,5: LET MO=(
MO=0): PRINT AT 17,25;("FILL" AND MO=1);(
"OVER" AND MO=0): GO TO 1300
1320 PRINT AT Y,X; OVER 1; PAPER 0;" ": L
ET X=X+(B$="X" AND X<31)-(B$="Z" AND X>0)
: LET Y=Y+(B$="K" AND Y<15)-(B$="O" AND Y
>0)
1340 PRINT AT 17,13;X;" ";AT 17,19;Y;" ":
 IF MO=0 THEN  PRINT  PAPER 5;AT Y,X; OVE
R 1;" ": GO TO 1300
1350 POKE 23607,246: PRINT AT Y,X; PAPER
5;CHR$ (GRA+32): POKE 23607,231: POKE ADD
```

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```
R+X+Y*32,GRA: GO TO 1300
1400 REM SAVE LEVELS
1410 SAVE "LEVEL"CODE 45056,6144: VERIFY
"LEVEL"CODE 45056,6144: GO TO 1030
1420 REM LOAD LEVELS
1430 LOAD "LEVEL"CODE : GO TO 1030
2000 DATA "CHEAT",5000,"BRILL",1000,"FAB"
,500,"GOOD",100,"ROTTEN",10,"?","?",0,"
?",0,"?",0,"?",0
2010 DATA 0,-2,1,0,4,3,2,0,4,2,3,4,8,7,6,
4,5,7,6,8,7,9,8,7,6,4
2020 DATA 255
  1 REM section 1
  10 REM room data
  20 CLEAR 45055: FOR c=45056 TO 45056+15
99: READ a: POKE c,a: NEXT c
  30 LOAD ""
1000 DATA 009,001,001,001,001,001,001,001
1001 DATA 001,001,001,001,001,001,001,001
1002 DATA 001,001,001,001,001,001,001,001
1003 DATA 001,001,001,001,001,001,001,010
1004 DATA 002,000,000,020,000,000,000,000
1005 DATA 000,000,000,000,000,000,000,000
1006 DATA 000,000,000,000,000,000,000,000
1007 DATA 000,000,000,000,000,000,020,002
1008 DATA 002,000,000,000,000,000,000,000
1009 DATA 000,000,000,000,000,000,000,000
1010 DATA 000,000,000,000,000,000,000,000
1011 DATA 000,000,000,000,000,000,000,002
1012 DATA 002,000,000,009,001,001,001,001
1013 DATA 001,001,001,001,001,001,004,000
1014 DATA 000,003,001,001,001,001,001,001
1015 DATA 001,001,001,001,010,000,000,002
1016 DATA 002,000,000,002,000,000,000,000
1017 DATA 000,000,000,000,000,000,000,000
1018 DATA 000,000,000,000,000,000,000,000
1019 DATA 000,000,000,000,002,000,000,002
1020 DATA 002,000,000,002,000,000,000,000
1021 DATA 000,000,000,000,000,000,000,000
1022 DATA 000,000,000,000,000,000,000,000
1023 DATA 000,000,000,000,002,000,000,002
1024 DATA 002,000,000,005,000,000,006,020
1025 DATA 000,009,001,001,001,004,000,000
1026 DATA 000,000,003,001,001,001,010,000
1027 DATA 020,006,000,000,005,000,000,002
1028 DATA 002,000,000,000,000,000,002,000
1029 DATA 000,002,081,082,020,000,000,000
1030 DATA 000,000,000,000,072,073,002,000
1031 DATA 000,002,000,000,000,000,000,002
1032 DATA 002,000,000,000,000,000,002,000
1033 DATA 000,002,083,084,020,000,000,000
1034 DATA 000,000,000,000,074,075,002,000
1035 DATA 000,002,000,000,000,000,000,002
1036 DATA 002,000,000,006,000,000,005,022
1037 DATA 000,007,001,001,001,001,001,001
1038 DATA 001,001,001,001,001,001,008,000
1039 DATA 021,005,000,000,006,000,000,002
1040 DATA 002,000,000,002,000,000,000,000
1041 DATA 000,000,000,000,000,000,000,000
1042 DATA 000,000,000,000,000,000,000,000
1043 DATA 000,000,000,000,002,000,000,002
1044 DATA 002,000,000,002,000,000,000,000
1045 DATA 000,000,000,000,000,000,000,000
1046 DATA 000,000,000,000,000,000,000,000
1047 DATA 000,000,000,000,002,000,000,002
1048 DATA 002,000,000,007,001,001,001,001
1049 DATA 001,001,001,001,001,001,004,023
1050 DATA 000,003,001,001,001,001,001,001
1051 DATA 001,001,001,001,009,000,000,002
1052 DATA 002,000,000,000,000,000,000,000
1053 DATA 000,000,000,000,000,000,000,000
1054 DATA 000,000,000,000,000,000,000,000
1055 DATA 000,000,000,000,000,000,000,002
1056 DATA 002,020,000,000,000,000,000,000
1057 DATA 000,000,000,000,000,000,000,000
1058 DATA 000,000,000,000,000,000,000,000
1059 DATA 000,000,000,000,000,000,020,002
1060 DATA 007,001,001,001,001,001,001,001
1061 DATA 001,001,001,001,001,001,001,001
1062 DATA 001,001,001,001,001,001,001,001
1063 DATA 001,001,001,001,001,001,001,008
1064 DATA 009,001,001,013,001,001,013,001
1065 DATA 001,013,001,001,013,001,001,001
1066 DATA 001,001,001,001,001,001,001,001
1067 DATA 001,001,001,001,001,001,001,010
1068 DATA 002,072,073,002,081,082,002,072
1069 DATA 073,002,020,023,002,000,000,000
1070 DATA 000,072,073,000,000,000,000,000
1071 DATA 000,000,000,000,000,000,000,002
1072 DATA 002,074,075,002,083,084,002,074
1073 DATA 075,002,000,000,002,000,000,000
1074 DATA 000,074,075,000,000,000,000,000
1075 DATA 000,000,000,000,000,000,000,002
1076 DATA 002,000,000,002,000,000,002,000
1077 DATA 000,002,000,000,005,000,000,000
1078 DATA 000,000,000,000,000,000,000,000
1079 DATA 000,000,000,000,006,000,000,002
1080 DATA 002,000,000,002,000,000,002,000
1081 DATA 000,002,000,000,000,000,000,000
1082 DATA 000,000,000,000,000,000,000,000
1083 DATA 000,000,072,073,002,000,000,002
1084 DATA 002,000,000,002,000,000,002,000
1085 DATA 000,002,020,000,000,000,000,000
1086 DATA 000,000,000,000,000,000,000,000
1087 DATA 000,000,074,075,002,000,000,002
1088 DATA 002,000,000,005,000,000,005,000
1089 DATA 000,012,001,001,001,001,001,001
1090 DATA 001,001,001,001,001,001,001,001
1091 DATA 001,001,001,001,008,000,000,002
1092 DATA 002,000,000,000,000,000,000,000
1093 DATA 000,002,000,000,000,000,000,000
1094 DATA 000,000,000,000,000,000,000,000
1095 DATA 000,000,000,000,000,000,000,002
1096 DATA 002,000,000,000,000,000,000,000
1097 DATA 000,002,000,000,000,000,000,000
1098 DATA 000,000,000,000,000,000,000,000
1099 DATA 000,000,000,000,000,000,000,002
1100 DATA 002,000,000,003,001,001,004,000
1101 DATA 000,012,001,001,001,001,001,001
1102 DATA 001,001,001,001,001,001,001,001
1103 DATA 001,001,001,001,004,016,017,002
1104 DATA 002,000,000,000,000,000,000,000
1105 DATA 000,005,020,000,000,000,000,000
1106 DATA 000,000,000,000,000,000,000,000
1107 DATA 000,000,000,000,000,000,000,002
1108 DATA 002,000,000,000,000,000,000,000
1109 DATA 000,000,000,000,000,000,000,000
1110 DATA 000,000,000,000,000,000,006,000
1111 DATA 000,000,000,000,000,000,000,002
1112 DATA 002,000,000,000,000,000,000,000
1113 DATA 000,000,000,000,000,000,000,000
1114 DATA 000,020,000,000,000,000,000,000
115 DATA 000,000,000,000,000,000,000,002
116 DATA 002,000,000,000,000,000,000,000
117 DATA 000,006,000,000,000,000,000,000
118 DATA 000,000,000,000,000,000,000,000
119 DATA 000,000,000,008,000,000,000,002
120 DATA 002,023,000,000,000,000,000,000
121 DATA 021,002,020,000,000,000,000,000
122 DATA 000,000,000,000,000,000,000,000
123 DATA 000,000,000,000,000,000,023,002
1124 DATA 007,001,001,001,001,001,001,001
1125 DATA 001,014,003,001,001,001,001,001
1126 DATA 001,001,001,001,001,001,001,001
1127 DATA 001,001,001,001,001,001,001,008
1128 DATA 088,087,088,087,088,087,088,087
1129 DATA 088,087,088,087,088,087,088,087
1130 DATA 088,087,088,087,088,087,088,087
1131 DATA 088,087,088,087,088,087,088,087
1132 DATA 088,000,000,000,000,000,000,000
1133 DATA 000,000,000,000,000,000,000,000
1134 DATA 000,000,000,000,000,000,000,000
1135 DATA 000,000,000,000,000,000,000,085
1136 DATA 086,000,000,000,000,000,000,000
1137 DATA 000,000,000,000,000,000,000,000
1138 DATA 000,000,000,000,000,000,000,000
1139 DATA 000,000,000,000,000,000,000,087
1140 DATA 086,000,000,000,000,000,000,085
1141 DATA 086,000,000,085,086,000,000,085
1142 DATA 086,000,000,085,086,000,000,085
1143 DATA 086,000,000,085,086,000,020,085
1144 DATA 086,000,000,000,000,000,000,087
1145 DATA 088,000,000,087,088,000,000,087
1146 DATA 088,000,000,087,088,000,000,087
1147 DATA 088,000,000,087,088,000,000,087
1148 DATA 086,000,000,000,000,000,000,000
1149 DATA 000,000,000,000,000,000,000,000
1150 DATA 000,000,000,000,000,000,000,000
1151 DATA 000,072,073,000,000,000,000,085
1152 DATA 086,000,000,000,000,000,000,000
1153 DATA 000,000,000,000,000,000,000,000
1154 DATA 000,000,000,000,000,000,000,000
1155 DATA 000,074,075,000,000,000,000,087
1156 DATA 086,000,000,085,086,000,000,085
1157 DATA 086,000,000,085,086,000,000,085
1158 DATA 086,020,000,085,086,000,000,085
1159 DATA 086,000,000,085,086,000,000,085
1160 DATA 088,000,000,087,088,000,000,087
1161 DATA 088,000,000,087,088,000,000,087
1162 DATA 088,000,000,087,088,000,000,087
1163 DATA 088,000,000,087,088,000,000,087
1164 DATA 086,000,000,000,000,072,073,000
1165 DATA 000,000,000,000,000,000,000,000
1166 DATA 000,000,000,000,000,000,000,000
1167 DATA 000,000,000,081,082,000,000,085
1168 DATA 088,000,000,000,000,074,075,000
1169 DATA 000,000,000,000,000,000,000,000
1170 DATA 000,000,000,000,000,000,000,000
1171 DATA 000,000,000,083,084,000,000,087
1172 DATA 086,000,000,085,086,000,000,085
1173 DATA 086,000,000,085,086,000,000,085
1174 DATA 086,000,000,085,086,000,000,085
1175 DATA 086,000,000,085,086,000,000,085
1176 DATA 088,000,000,087,088,000,000,087
1177 DATA 088,020,000,087,088,000,000,087
1178 DATA 088,000,000,087,088,000,020,087
1179 DATA 088,000,000,087,088,000,000,087
1180 DATA 086,000,000,000,000,000,000,000
1181 DATA 000,000,000,000,000,000,000,000
1182 DATA 000,000,000,000,000,000,000,000
1183 DATA 000,000,000,000,000,000,000,085
1184 DATA 088,022,000,000,000,000,000,000
1185 DATA 000,000,000,000,000,000,000,000
1186 DATA 000,000,000,000,000,000,000,000
1187 DATA 000,000,000,000,000,000,021,087
1188 DATA 086,085,086,085,086,085,086,085
1189 DATA 086,085,086,085,086,085,086,085
1190 DATA 086,085,086,085,086,085,086,085
1191 DATA 086,085,086,085,086,085,086,085
1192 DATA 009,001,001,013,001,001,001,001
1193 DATA 001,001,001,013,001,001,001,001
1194 DATA 001,001,001,001,001,001,001,001
1195 DATA 013,001,001,001,001,001,001,010
1196 DATA 002,072,073,002,021,000,000,000
1197 DATA 000,000,023,002,023,000,000,000
1198 DATA 000,020,020,000,000,000,000,023
1199 DATA 005,000,000,000,000,077,078,002
```

Colour Scroll

Adam Wright

This short routine for the C64 will enable you to fill the screen with series of scrolling horizontal coloured bands. The syntax for the command is SYS 49152

```
0 REM COLOUR SCROLL
1 DATA 120,230,250,165,250,141,32,208,24
,105,1,141,33,208,160,0,162,0,232,224
2 DATA 160,208,251,200,192,1,208,244,240
,227
5 CS=49152:CK=0:FOR A=CS TO CS+29
6 READ D:POKE A,D:CK=CK+D:NEXT A
7 IF CK<>4617 THEN PRINT "ERROR":STOP
8 U=CS+10:POKE U,1:SYS 49152

READY.
```

Mouse

Darryn Lavery

This short routine in Atari ST Basic allows you to turn the mouse pointer on or off as you require.

The syntax is simply GOSUB MON or GOSUB MOFF.

```
'       ASM MOUSE SWITCH BY DARRYN LAVERY
'       ' E.G GOSUB MOFF MEM MOUSE OFF
'       END
'       MON: POKE CONTRL,122:POKE CONTRL+2,0 [illegible]
'       POKE INTIN,0:VDISYS(1):RETURN
'       MOFF:POKE CONTRL,123:POKE CONTRL+2,0:[illegible]
'       VOICEVOICE:RETURN
```

Extra Sound

Alan Crawford

One of the more powerful features of the Atari's Pokey sound chip is its ability to join two sound channels together to create one with a far greater frequency range. This is known as 16 bit sound as the frequency can be any 16-bit number (0-65535) instead of the 8 bit value (0-255) used in the normal SOUND command

The routine is called using DUMMY=USR(1536,VOICE,FREQUENCY, DISTORTION,VOLUME). DISTORTION and VOLUME are the same as those in the standard SOUND command. VOICE is either 0 or 1 and FREQUENCY is in the range 0-65535. 16 bit sound can be produced from Basic by poking better as it makes the changes to the resistors instantaneously

```
10 REM 16 BIT SOUND
20 REM BY ALAN CRAWFORD
30 REM DUMMY=USR(1536,FREQUENCY,DISTORTION,NOISE)
40 FOR L=1536 TO 1592:READ D:POKE L,D:NEXT L
50 STOP
60 DATA 104,201,4,208,43,104,104,41,1,10,10,168,104,153,2,210
70 DATA 104,153,0,210,104,104,41,15,10,10,10,10,153,1,210,133
80 DATA 203,104,104,41,15,5,203,153,3,210,169,24,141,8,210,96
90 DATA 170,240,5,104,104,202,208,251,96
```

Attention!

Unfortunately due to the sheer volume of submissions our returns department has been unable to cope satisfactorily. So, from now on we are requesting that you include a suitable stamped addressed envelope for return of your submission. Not enclosing a suitable SAE will mean that your program will not be returned. You have been warned.

The beneficial side of this system is that 90% of submissions will be returned within one week. A small price to pay for such a service I'm sure you'll agree.

With regards to future submissions we are looking for articles on programming in general, utility programs and applications software and lastly, good games. Here are a few types of program we don't want: Educational, hangman, pools predictors, mastermind, flashing borders, bank accounts, disc catalogues and clocks.

If you can't get a program listing in the magazine to work ring in to see whether it was faulty rather than writing. If there were problems then we'd let you know. Corrections normally appear a couple of weeks later. Thanks.

Duncan Evans
Technical Editor

with Kenn Garroch

External tape for CPC

Jonathan Davies, of Bishopston, Bristol, writes:

Q Following the recent demise of my CPC464's tape recorder, I thought that rather than get it repaired, I would attempt to connect up an external recorder. Looking inside the Amstrad's case, I found the connection between the tape deck and the circuit board, but there's no indication as to which lead is which. Any ideas?

One other thing: could you tell me exactly what the Z80 HALT instruction does, just out of interest?

A Not so easy this one I had a look at my 664 and the following is the best I can do. I presume that the colours are the same in any case, this is from left to right looking at the circuit board connection from the cassette end:

Red	Main power switch (to)
Black	Ground
White	Main power switch (from)
Blue	Don't know but I presume this is either signal in or out
Green	Connected to volume control so probably comes from the sound chip
Brown	Appears to be connected the same as white
Grey	Same comment as blue
Yellow	Motor relay control

Logically, there should be a signal in and a signal out (record and play) and I think these are on the blue or grey wires. The problem you will have is that the signal levels are almost certainly not the same as those used on a normal cassette recorder. The best thing to do is to try it and see – with care. Sorry I can't be of more help.

The Z80 HALT instruction stops the processor from executing any more instructions. The memory continues to be refreshed but no further instructions are executed until an interrupt or reset occurs. One use for the instruction would be to synchronise the processor with some external activity that causes an interrupt.

Flying in from the USA

John Martin, of Nicosia, Cyprus, writes:

Q I am considering asking a friend of mine in the States to send me a program – *Flight Sim II* for my Amstrad PC. It's cheaper there, but it's for the IBM and produced by Microsoft.

My question is, will it run OK on my 512K Amstrad PC, or will I have wasted rather than saved money?

Also, could you tell me what the six extra screens available for this program are?

A As far as I know, the Amstrad PC is 99·99% compatible with the IBM PC and in this case, *Flight Sim* will run – well worth the money it is as well. I think *Flight Sim II* is published by Sublogic; Microsoft produced *Flight Sim I*.

By extra screens, I think you must be referring to the extra scenery discs that are available. If my memory serves, the scenery that comes with the program is based around New York, Chicago, and Florida. The extra scenery discs provide the information that the computer needs to go to other places and airports, covering most of the USA.

Recursion in Basic

Martin Jameson, of Glasgow, Scotland, writes:

Q Could you please explain what recursion is? I saw it mentioned in your article on Lisp but, not yet having a version of the language, I was wondering if it is possible to do it in Basic. If so, could you explain?

A The problem with most Basics is that they don't have local variables, and therefore don't stack them up in subroutine calls.

Recursion, in its simplest form, is a subroutine that calls itself, usually with different arguments. Basic normally does all of its looping via FOR NEXT or IF THEN (or perhaps WHILE . WEND and REPEAT . UNTIL).

Generally, these methods are good enough for all occasions, especially since the language is based around them. However, recursion is a neat and sophisticated programming method that is sometimes easier to use.

Recursion works by keeping all of the variables related to a level, local to that level, eg.

```
10 a=10
20 gosub 100
100 if A=0 then return
110 A = A - 1
120 gosub 100
```

Here, A starts off with the value 10 which then has one subtracted to give 9 which is used as the argument for the next *gosub*. In the top level, A=10, the second A=9 the third, A=8, etc. However when A reaches 0, the recursion unwinds and A should have the values assigned to it at each *gosub*, ie, 0 1 2 3 4 5 6 7 8 9 10. Since A is not local and therefore not stored for each *gosub*, the recursion does not work. A remains zero all the way back up, ie, at every return.

Two subroutines are needed to get around this and to store the values needed at each level. The stack is an array (of the type needed to store the variable) and starts out with a pointer, *pnt*, giving the next available space in it (first of all *pnt=0*). To put something on the stack, *stk(pnt)=variable* is used, and *pnt=pnt+1* so that the pointer always gives the next available space.

Popping something off the stack requires the opposite process, ie, reduce the stack pointer by one, and then get the value at that location.

To show this working, try the program Prog 1 below.

Prog 1

```
10 DIM stk(100)
20 pnt=0
30 b=5
40 GOSUB 70 :REM recur
50 PRINT b;
60 END
70 REM recur: the subroutine
75 print b;
80 IF b=0 THEN RETURN
90 a=b:GOSUB 150: REM push
100 b=b-1
110 GOSUB 70 : REM recur
120 GOSUB 190 :REM pop
130print b
140 RETURN
150 REM push:
160 stk(pnt)=a
170 pnt=pnt+1
180 RETURN
190 REM pop:
200 pnt=pnt-1
210 a=stk(pnt)
220 RETURN
```

This prints the value of b at each level, and gives the result:

```
5 4 3 2 1 0 0 1 2 3 4 5
```

So, as the subroutine calls itself, the value of b is being saved on the stack with push on the way in, and is then recalled via the pop routine on the way out.

An example of recursion is shown in Prog 2 and evaluates the factorial of 5 (5*4*3*2=120).

One thing that may cause problems on some micros is the size of the *gosub* stack.

This is an internal stack that is used to maintain control over subroutines and their return positions.

Prog 2

```
10 DIM stk(100)
20 pnt=0
30 b=10
40 GOSUB 70 :REM recur
50 PRINT a
60 END
70 REM recur
80 IF b=1 THEN RETURN
90 a=b:GOSUB 150: REM push
100 b=b-1
110 GOSUB 70 : REM recur
120 GOSUB 190 :REM pop
130 b=b*a
140 RETURN
150 REM push:
160 stk(pnt)=a
170 pnt=pnt+1
180 RETURN
190 REM pop:
200 pnt=pnt-1
210 a=stk(pnt)
220 RETURN
```

Some Basics only have a limited stack space available for this and cause problems when trying to perform recursion since a subroutine can only call itself a limited number of times.

The ST on television

P Godley, of Worksop, Notts, writes:

I am probably one of many currently considering buying an Atari 520 STFM after the announced price cuts.

There are, however, a few points on which I am still unsure. Would my Toshiba HXP550 printer be compatible with the ST? Its cable is an 8 bit parallel interface, according to the manual.

I understand that some of the ST software currently available can only run with a colour monitor.

If I were to use a normal colour TV, would this in any way restrict the range of software I could use? I accept that the picture quality would not be as good.

Is it possible for the ST to run any of the disc software currently marketed for the other Atari 8-bit machines?

A There is a good chance that you will be able to use the printer with the ST. An 8-bit parallel interface almost always refers to the Centronics standard. The ST is Centronics compatible, so you should have no trouble (apart from making up the cable).

The output from the modulator is the same as the low and medium resolution screen modes. The high res monochrome is the only picture you will not be able to get on the colour TV or monitor. Pretty well all software for the ST is either low or medium resolution, so you will be able to see it on your colour TV.

There are a few applications that are high res only, they are, however, quite rare and usually highly specialised.

To run Atari 8-bit software on the ST, you would first of all need to be able to read the discs, and secondly have an 8-bit emulator. As far as I know, neither of these things are possible – as yet.

Cheese-tasting session

Paul Brokee, of Richmond, N Yorks, writes:

I purchased a mouse and *Cheese* package for use with the Commodore 64. I designed quite a few pictures which are saved on tape. The *Cheese* program will load them in again but I would like to be able to use them in my own programs, ie, load pictures without the *Cheese* program. Do you know a way of doing this?

A The short answer is unfortunately, no. However the following explanation of the 64's screen workings may help you find how and where the picture is loaded into memory. Once you know this you can write a program to decode any pictures you have drawn.

The C64 has two graphics modes, high res and multi-colour, which one the mouse and *Cheese* is using, I don't know. However, if there are a lot of colours in the picture, it is multi-colour. This is likely since it is the best and most commonly used graphics mode.

The Vic chip in the 64, the device that controls the graphics, allows screens to be placed in different areas of memory, and a multi-colour screen consists of three areas. The colour Ram starts at 55296, then the main colour area whose start depends on the Vic setting, and the bitmap area where, again, the position depends on the Vic chip. The last two areas are positioned in the current bank by the Vic, and the bank is selected by the lowest two bits of 56576.

The addresses of the bitmap and the main colour area are found as shown below.

From this you can see that the four banks are: 0–16383, 16384–32767, 32768–49151, 49152–65535.

The thing to notice about B0 and B1 is that they are inverted.

Main colour

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
B1	B0	V13	V12	V11	V10	0	0	0	0	0	0	0	0	0	0

Bitmap

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
B1	B0	B13	B12	B11	B10	0	0	0	0	0	0	0	0	0	0

Where:

	7	6	5	4	3	2	1	0	
53272	V13	V12	V11	V10	B13	B12	B11	1	(last bit always 1)
56576	x	x	x	x	x	x	B1	B0	(these are inverted 1=0, 0=1)

For instance, poking 56576 with 1 gives the bank from 32768–49152, and poking with 0 gives 49152–65535.

Once B0 and B1 are set, the position of the bitmap and the colour area can be set. The bitmap can occupy any of eight positions within the bank, the bank base address plus 2K increments, ie, for bank 2 (16384–32767) it can start at 16384, 18432, 20480, 22528, 24576, 26624, 28672 or 30720. However, since it is 8K bytes long, only a couple of these are really feasible.

The main colour area can start at the bank base address plus 1K increments giving 16 positions. The problem is that both the colour area and the bitmap have to be within the same bank and it is better if they don't overlap.

So, feasible positions in, say, bank two are 24576 for the bitmap and 23552 for the colour area. Alternatively 16384 for the bitmap and 24576 of the colour area. There are other possibilities, it's just a matter of moving things around.

OK, now we get to finding the picture. The first thing to do is to find the load address of the screen.

Presumably the mouse and *Cheese* package stores the pictures as separate files, each with its own header.

The header is at the start of the file, and tells the computer such things as the load address and end address plus the file type.

The load address is what we are interested in. So, put in a tape with a picture file on it, type OPEN 1 and press return. This will read the header into the cassette buffer starting at 828. When control returns to the 64 keyboard, type

```
?PEEK(829)+256*PEEK(830)
```

(Note 1st byte is file type, 2/3 start address, 3/5 end address)

This is the start address and should give you an idea of which bank the picture is going to be loaded into. The address should be one of the bitmap positions in the appropriate bank (it is possible that it is the colour map).

The picture file should consist of three parts: the bitmap, the main colour area, and the colour Ram. Since the bitmap is the largest, it makes sense not to have to move it around in memory. Therefore, it is logical to put it as the first part of the file.

Note that if this is not the case then things are a lot harder. The following program should find the picture for you:

```
5 POKE 53265, PEEK(53265) OR 32:REM SET BITMAP MODE 6 PEEK 53270, PEEK(53270) OR 16 REM SET MUL COL MODE
10 GET A$
20 IF A$="B" THEN BN=BN+1:POKE 56576,(PEEK(56576) AND 252) OR BN
25 REM STEP THROUGH BANKS
30 IF A$="M" THEN BM=BM+2 POKE 53272,PEEK(53272) AND 241) OR BM
35 REM STEP THROUGH BITMAPS
40 IF BN=3 THEN BN=-1
50 IF BM=14 THEN BM=-2
60 IF A$="Z" THEN BM=0:BN=0
70 GOTO 10
```

What the program does is allow you to move the bank and bitmap addresses around until you see some kind of picture on the screen.

Load the picture, then run this program. You will have a good idea of which bank to look in from the header information. Step through the various bitmaps until you can see some resemblance to your picture (make it a simple one with not too many colours).

Pressing Run/Stop Restore and examining BM and BN tells you the bank and position of the bitmap. The length of the bitmap is 8000 bytes, so the next 1000 contain either the main colour area or the Ram colour.

Set up the Ram colour area to somewhere convenient in the bank and copy the next 1000 bytes into it (a simple *for next* loop peeking and poking) then the next 1000 bytes to the colour Ram area. Then set up the bank, modes, and base address registers and see if the picture is correct. If the colours are wrong, swap the colour areas over and try again.

It may be that one of *Popular*'s readers already knows the answer in which case, they could be really kind and send it to me.

Horizontal routines

A Denby, of Alcester, Warks, writes:

I am writing a machine code for my Atari ST and I want to put it into a cartridge. My first problem is that nobody seems to ad-

continued on page 35 ▶

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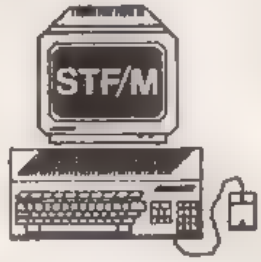

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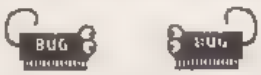

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◀ continued from page 33

vertise Eprom programmers for the ST, any ideas why not? Is it possible to connect a sideways Ram like the BBC to the ST's cartridge port? If it is, could you please explain how it is done?

Another problem I have encountered is trying to patch a routine of my own into the horizontal blank interrupt. Could you please explain how this is done?

A The most probable reason why no one has produced an Eprom programmer for the ST is that the machine is still relatively new. No one has decided that the machine needs one after all, there is at least 512K of Ram to use up before extra programs need to be stored on a cartridge.

However, it is obviously possible to attach some kind of programmer but not to the cartridge port (see later), all that is needed is a little know-how. Wait a while, someone will start producing one eventually.

Similar arguments apply to the sideways Ram idea although, since the 68000 microprocessor has an address range of 2^24 or 16,777,216 bytes there seems to be little need of a sideways Ram. What is needed is additional Ram and the ST is upgradable to at least 2M bytes (2,097,152 bytes) which is a lot (see the Mega STs). You can't, easily, attach Ram in the cartridge port because there is no memory write line available, although Roms are all right since they are read only.

OK, after the above failure, here is something I can help with, the horizontal blank interrupt. This is easily accessed by simply redirecting the level two interrupt vector at $68. Normally this points to a routine which turns the interrupt off, ie,

```
hbl     move    d0,-(sp)
        move    2(sp),d0
        and     #$700,d0
        bne     #hblnz
        or      #$300,2(sp)
hblnz   move    (sp)+,d0
        rte
```

To make sense of this, the interrupt structure of the ST must be explained. The 68000 has seven interrupt levels and the higher the number, the higher the priority, ie, level six is able to interrupt level four but not vice versa.

The ST only uses three of these, 2 (HBL), 4 (VBL), and 6 (MFP 68901) and as you can see, the horizontal blank interrupt has the lowest priority. Level seven is non-maskable but is not used in the ST so, all interrupts can be disabled by setting all the interrupt bits in the status register.

The bits in question require supervisor status and are bits 8, 9 and 10 of the status register (0–7 is the low byte). Neither the VBL (Vertical Blank) or the MFP 68901 (Multifunction processor) vectors should be diverted since they generally cause a crash and in any case, there are better ways of accessing these.

The HBL, on the other hand, can simply be redirected by putting the address of the new routine in the correct position in the interrupt vector table (memory location $68).

Again, this will require supervisor status since it is a reserved location.

The following program shows the HBL routine set up to change the screen colour pallette 0. A couple of things to notice are that the result is not stable, and moving the mouse causes problems. The reason for the first I am not too sure about. It appears to be something to do with the HBL not being tied into the VBL so it never knows where the top of the screen is. I have tried to stabilise by synchronising with the VBL but, although the picture steadies a little, it is still very wobbly.

The reason for the mouse causing problems is that the keyboard interrupt comes through the MFP, and therefore interrupts the HBL routines, it being of higher priority.

If you want to synchronise a HBL routine with the display, the best thing is not to use the HBL interrupt at all. The MFP has a register that counts the number of horizontal blanks this can be used (in colour modes anyway to achieve split screen effects. It is also a lot more stable when used in conjunction with the VBL to note the top of the screen.

The MFP timer in question is B at interrupt MFP int level 8. Look at *xbios* calls 26, 27, 31 and 13. There will also be a fuller discussion on this subject in the September issue of our sister publication *ST Update*. If you are still struggling, write and tell me what you are trying to do, and I'll see whether I can help.

```
START   MOVE.L  A7,A5                  Standard header
        MOVE.L  #USTK,A7               Set up local stack
        MOVE.L  4(A5),A5               Base page address
        MOVE.L  $C(A5),D0
        ADD.L   $14(A5),D0
        ADD.L   $1C(A5),D0
        ADD.L   #$100,D0               Skip base page
        MOVE.L  D0,-(SP)
        MOVE.L  A5,-(SP)
        MOVE.W  D0,-(SP)
        MOVE.W  #$4A,-(SP)
        TRAP    #1
        ADD.L   #12,SP
        BSR     GO
        MOVE.L  #0,-(SP)
        TRAP    #1

GO      bsr     sethbl                 Set up HBL interrupt
        bsr     wkey                   Wait for a keypress
        bsr     rsthbl                 Turn interrupt off
        rts

sethbl  bsr     super                  Super mode
        move    sr,d0                  Get the status register
        or      #$7,d0                 Set no interrupts
        move    d0,sr
        move.l  $68,hbpt               Save old vector
        move.l  #hbl,$68               Set new
        move    sr,d0
        and     #$F8FF,d0              Set int level to 0
        move    d0,sr                  Put back
        bsr     usuper                 back to user mode
        rts

rsthbl  bsr     super
        move    sr,d0                  Get the status register
        or      #$7,d0                 Set no interrupts
        move    d0,sr
        move.l  hbpt,$68               Reset old vector
        move    sr,d0
        and     #$F8FF,d0              Set int level to 0
        move    d0,sr                  Put back
        bsr     usuper                 back to user mode
        rts
hbpt    ds.l    1                      Save pos for old hbl vector

* This is the HBL routine itself - it is an interrupt and hence an exception so use RTE *
hbl     subq    #1,cnt                 Delay before doing anything
        beq     hblg                   Until zero - go
        rte                            Else return - this is exception return
hblg    move.l  a0,-(sp)               Save A0 since it's corrupted by routine
        move    #100,cnt               Reset counter
        lea     $ff8240,a0             Address of pallette 0
        eor     #1,(a0)                Flip colour
        move.l  (sp)+,a0               Get A0 back
        rte                            End exception

cnt     dc.b    100                    Counter

super   clr.l   -(sp)                  ;Go into supervisor mode
        move    #$20,-(sp)
        trap    #1
        addq.l  #6,sp
        move.l  d0,stksve
        rts
stksve  ds.l    1
usuper  move.l  stksve,-(sp)           ;Go into user mode
        move    #$20,-(sp)
        trap    #1
        addq.l  #6,sp
        rts
wkey    move    #$FF,-(sp)             ;Wait for a keypress
        move    #6,-(sp)
        trap    #1
        addq.l  #4,sp
        beq     wkey
        rts
        DS.L    256
USTK    DS.L    1                      User stack of 256 longs
        EVEN

        END
```

Getting started in communications

Take a computer, plug in a modem and telephone line and you've got access to the world of computer communications. Here, Steve Gold takes readers through the basics of modems, baud rates and the rest of the jargon.

Judging from the myriad computer communications articles that appear in magazines such as *Popular Computing Weekly*, you'd think that linking your computer to a modem and phone line was the easiest thing in the world – as simple as popping a disc into a drive, in fact.

Sadly, many potential enthusiasts are put off by the jargon involved, which is – in common with many computing activities – shrouded in mystique.

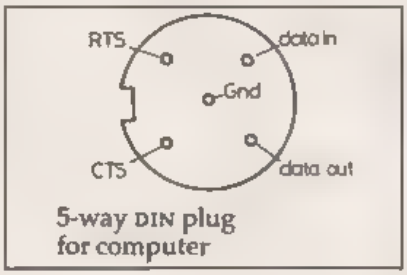
Ten years ago, when modems first began to appear, they were a mystery for the great majority of computer users. With the advent of low-cost technology however, computer communications has been transformed from an expensive elitist hobby into a sport for the computer masses. Latest estimates say that one in 20 computer owners has access to – either at home, work or school – a computer modem.

The modem

Most computer users will be familiar with the printer port on their computer. This is called a parallel port, since 8-bit computer data is fed through eight separate wires – in parallel – so that each byte (eight bits) of data arrives at the printer at the same time.

The serial port – so called because data is fed serially, one bit after another – is perhaps less familiar. Unlike the parallel port on a computer, most computer serial ports can cope with data travelling in both directions at once.

At its most basic, a serial port – as found on the BBC micro – is a five pin array. One pin serves as a signal ground, one as a transmit wire, one as a receive wire, and two control circuits – one each for the transmit receive wires – completing the picture.



5-way DIN plug for computer

On many computers however, a 25-way D-type connector – as shown in diagram one is fitted. Don't be discouraged by so many connections, it's simply that the RS232 standard – because it is a standard – has to accommodate several different types of wires to and from a variety of computers and their associated devices (printers modems etc)

Most computers today can be made to communicate with others if their serial port is connected to a modem, which is then connected to a telephone line.

The word modem may sound vaguely foreign, but it originates from the US (like most things computerate do) and actually stands for MODulator – DEModulator

All set up: modem, computer and telephone

What is a modem?

A modem is a device that converts digital data into analogue signals for transmission over telephone lines, and that converts the received analogue signals back into digital data. Its name is derived from these two functions of modulation and demodulation. Modems are used to connect computers and computer terminals to telephone lines so that they can transmit data to one another at a distance.

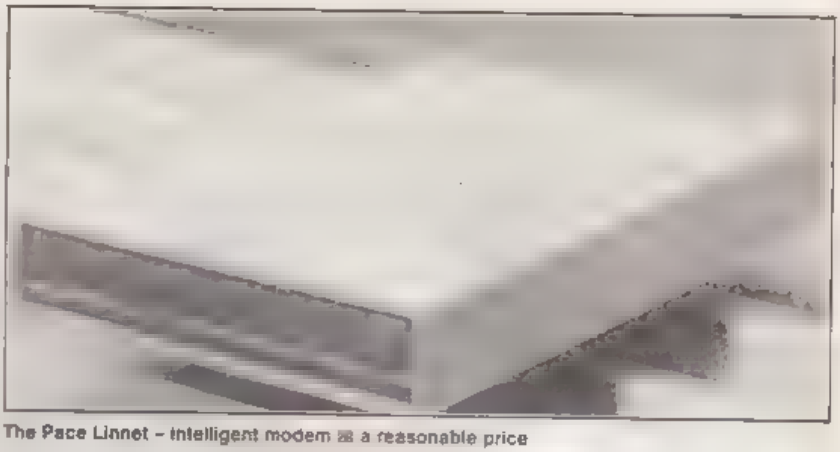
Digital data from a computer terminal, in the form of a sequence of bits, is fed to a modem. The modem converts the bits into an analogue signal that preserves the distinction between the low and high bits; for example, the bits may be converted into two frequencies such as 1,200Hz and 2,200Hz.

At the receiving end, another modem detects the two frequencies and produces a digital signal that is essentially identical to the original digital signal. The computer may be unable to distinguish whether it is directly connected to a terminal or connected by telephone line.

If the terminal and the computer can send data to one another, the modems are operating in full duplex mode. If only one of them can send data at any given time, the mode is called half duplex.

As well as a modem, computers also need suitable communications software – sometimes called 'terminal software' – to allow data going in and out via the serial port to be displayed on screen, saved to disc and/or tape, as well as being dumped to a printer (if fitted).

A modem can cost as little as £20. Some services, such as Micronet on Prestel, will even give you a modem if you contract to use (and pay) for the service for a year. The cost of the modem is, of course, a sweetener to get you to sign on the dotted line. For some users, however, the offer of a free modem may well be worth the trouble of signing a contract.



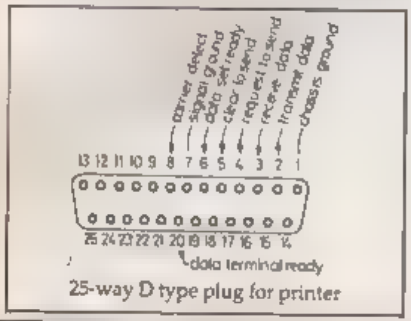
The Pace Linnet – intelligent modem at a reasonable price

How a modem works

In its simplest form, a modem takes the serial data that is squirted down the RS232 interface link and converts it into a series of data blips that can be carried over a telephone or similar audio circuit.

Unlike a telephone microphone, which converts audible sound into electrical energy, a modem does the exact opposite and converts electrical energy into audible sounds – just like a loudspeaker in a radio, TV or telephone earpiece in fact.

But there the similarity ends as, unlike a loudspeaker circuit, a modem only has to process a very simple stream of data into a series of simple tones.



25-way D type plug for printer

Different speeds

As you've probably guessed, modems can operate at different speeds, ranging from 300 bits per second right up to 19,200 bits per second and beyond. Most modems in the UK today work at one of four different speeds:

300 baud – where both the send and receive channels process data at 300 bits per second

1200/75 baud – where one channel operates at 1200 bits per second and the other at 75 bits per second

1200 baud – where data flows at 1200 bits per second in both directions.

continued on page 38

Glossary

Ascii
Short for American Standard Code for Information Interchange. Ascii is a standard system of storing and transmitting data. The Ascii system allows 128 different characters and special characters to be transmitted using an agreed definition for each of the 128 possible on-off combinations in a seven-bit sequence.

Asynchronous
A method of transmitting data characters that are preceded with start bits and followed by stop bits. These start and stop bits allow the receiving computer to recognise each character as a separate character when it arrives.

Baud
Baud is a means of expressing the transmission of data. Often used interchangeably with 'bits per second'. 300 baud – a very common speed for modems – is roughly equal to 300 bits per second. 300bps is approximately equal to 30 characters per second.

Demodulator
An electronic device that takes a modulated signal - usually from telephone circuits - and converts it into binary signals, suitable for feeding into a computer. A modem has a demodulator in it (as well as a modulator).

Error checking
Usually part of a process of transmitting data from one computer to another. Error checking ensures that the data received is the same as data sent. There are several different techniques of error-checking used in communications.

File transfer
Describes the act of sending a computer file from one computer to another, usually over a modem to modem link.

Network
A communications system for computers. Networks allow data to travel between computers. The telephone system is an example of a network – in this case it is the Public Switched Telephone Network (PSTN).

Synchronous
A method of transmitting data that employs synchronisation characters sent at the beginning of a message. If Ascii characters are being sent, each seven bits subsequent to a synchronous character is recognised as a letter, number or similar character. Machines must be synchronised so that there is no disagreement as to where one character ends and another one starts.

Terminal
A device that connects with a computer, allowing someone to send and receive data using a keyboard. In the early days of computer communications there were two types of terminals – printing and visual display (VDU). Terminals have largely given way to computers running terminal emulation software.

◀ continued from page 37

2400 baud – where data flows at 2400 bits per second in both directions.

At this point you've probably noticed that the word baud has crept into the text. As can be seen from the glossary, baud is merely another way of expressing bits per second.

Like the word modem, the word baud originates from the United States. Early British modem users, on the other hand, preferred to use bits per second – shortened to bps – as their measure of data speed. Many reference books still refer to 'bps' in preference to the brash-sounding baud!

Using a modem

Like most computer peripherals, a modem works as an adjunct to the computer itself. In most cases, even after a computer has been equipped for communications, its work applications remain the same.

Thus, even whilst the modem is connected to the serial port of your micro, it remains inert until suitable software is loaded in and run. This saves having to plug the modem in and set it up each time you want to use it.

Imagine your computer at home. If it's used for entertainment (and educational) purposes without a modem and communications software it's limited to the use of those programs that you happen to have in your personal collection.

When connected through the telephone line to other computers however, you have access to all the electronic games and other programs on the other computers as well as much wider choice.

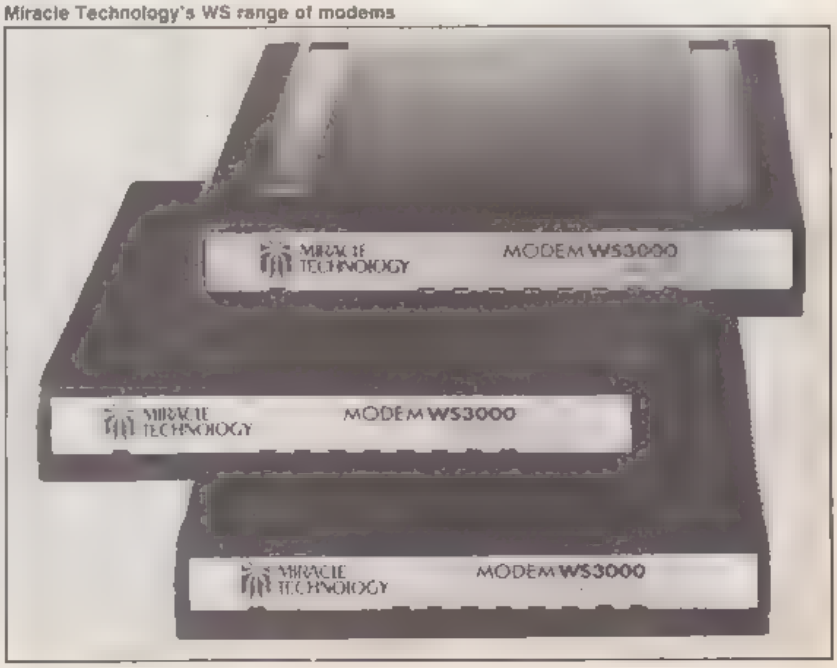
By sending messages through the modem and down the phone line, you can join a club that operates a remote bulletin board – a BBS. Through a BBS you can communicate electronically with other members. You can sometimes shop via online catalogues and order the goods via your modem.

I hope you've enjoyed this brief summary and introduction to modems and computer communications. Perhaps those readers of *Popular Computing Weekly* who are already experienced in the world of computer communications will also have gleaned a few facts they may have missed in what is an exciting extension of a home and small business microcomputer's capabilities.

The RS232 standard

The RS232 interface is a standard for connecting business machines (including computers) with other devices using a serial interface. The latest revision of the RS232 standard, known as the RS232-C, was formulated by the Electronic Industries Association (EIA) of Washington in the United States in 1969.

Miracle Technology's WS range of modems



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POPULAR COMPUTING WEEKLY

Four-track recording wanted – on a budget

Mark Jenkins comes to the rescue of a musically-inclined Commodore owner, and looks at a sound editor from new company Softworks..

We kick off this week with a letter from John Hannah from Shotts Community Education Centre. John has what he describes as an "under-utilised" Commodore 64 together with a Yamaha PSR50 keyboard, which has several auto-accompaiment features plus a Midi In and Out facility.

John wants a Midi interface and a sampler or synthesiser add-on for the 64 for use in four-track recording, and has been looking at the Datel sampler and interface. He's very kindly enclosed handbooks for both the Datel lines and the PSR 50, which makes it somewhat easier to comment in a sensible manner.

Datel's Digital sound sampler is a monophonic unit which will give pretty high quality sampled sounds, which you can create yourself and store on to disc. You can replay them either through your monitor or through a hi-fi. Price is £49.99, and in addition, Datel has alternative software which turns the unit into a drum sampler, called *Com Drum*.

So the Datel system (with a Midi interface at £29.99) is a good starting point, but since John already has a drum section on his keyboard, he can only usefully add monophonic samples using the Datel setup.

In fact you won't find a polyphonic sampler under £350 or so (the second-hand price of the Midi-equipped Akai S612) so a synthesiser module may be more appropriate. The problem here is that the best one – the Commodore/Music Sales FM Synth Expander – *still* doesn't have a Midi interface more than a year after its release, so it can only be driven off the Commodore's Qwerty keyboard (the same applies to its sampler). You'd do better to wait for the new Cheetah synth module which will come in at around £180. This has six digital oscillators and is multi-timbral – each oscillator can play a different sound via Midi.

On the sampling side, you could go for the Midi-equipped *Microvox* at around £200 new. It provides much higher quality than the Datel unit and although it's monophonic, it can produce different sounds from different zones on the controlling keyboard. Consult supersoft for dealer information.

Overall, my advice would be to go for the following set up: Datel Midi Interface, Datel Sampler, Cheetah Synthesiser, and C64 Sequencer software.

This would give you monophonic samples playable from the Yamaha keyboard plus multi-timbral synth sounds playable from the C64 sequencer (a SIEL, Jellinghaus, EMR, Steinberg or C-Lab package from music shops would do the trick).

Played by hand

Obviously you couldn't use the C64-based sampler and sequencer at the same time, so the sampled parts would have to be played by hand after laying the initial tracks on to tape, unless you want to invest in a second C64. Everything should lock together timing-wise thanks to the Yamaha's ability to send and receive Midi clock information.

Obviously this is all a bit outside John's suggested budget of £120, but what did you expect – restraint?

On the ST front, Tigress Designs has, as promised, delivered a colour version of *Iconix*, about the friendliest of the professional multitrack Midi sequencers. There's no hardware involved except an anti-pirating dongle, and the software allows you to control most of the sequencer functions from your synth using a system called soft keys. That way, you never have to touch the computer, which is handy if your controlling keyboard is on the other side of the room. Anyway, a full review of the new, upgraded, de-glitched colour version soon.

Powerful synth

Also on the subject of the ST, we've been looking at *EDTX81Z* from a new company called Softworks.

This package runs on a monochrome monitor only and is designed to edit and store sounds for the Yamaha TX61Z synth module. As we should all know by now, the TX81Z is a tremendously powerful synth – at only £450 or so it fits into one unit of 19 inch rack space, plays eight-note multitiambrally, and is a pain to edit, thanks to its extreme lack of front panel controls.

That's a pity, because the machine has many powerful features which allow you to make the most of four-operator FM synthesis. The operators (sine wave oscillators) which create the sounds are also capable of non-sine waveshapes, which can give a thicker overall sound, and you can detune them from each other in various ways and add effects such as delay and autopan.

EDTX81Z solves all the editing difficulties by putting the synth's parameters up on a single screen. In fact there are two alternative editing layouts – a fully graphic one with diagrams of the algorithms used, and an alphanumeric one dealing largely in figures for more precise editing.

It's possible to slave parameters together so you can alter several simultaneously, and to speed up or slow down the rate of change. Once you've edited a selection of sounds you can save them singly or in bulk, and if you save them to Bank I they will be instantly transferred to the synth as well.

You can also edit complete sets of performance parameters which assign the number of voices available for each sound, the sound used, the pan position, effects and so on.

You can play any note on the synth at any velocity using the computer's control button, which is handy if you want to do some editing without the control keyboard present, and you can re-program the Midi Patch Number response of the synth, so any sound you like can come up on receipt of any Midi patch change command.

You can also program a new scale for the synth and invert the existing microtonal scales. It's also possible on *EDTX81Z* to randomise the scale (perhaps useful for percussion sounds).

EDTX81Z lacks randomising functions for the sounds themselves, although these may be added on a later version. The company may also release editors for the Roland MT32 and the Yamaha DX7MkII/TX802 eventually, and these are expected to sell at the same price – £59.95.

EDTX81Z is available from Softworks by mail or from Argent's in Denmark Street, London WC2. On the whole, the program is more precise than its main competitor, the Soundbits TX61Z Voice Master from Syndromic, but lacks its randomising functions and will only work on a monochrome monitor at the moment. It is £10 cheaper, though!

Softworks, 32 Chalcot Road, London NW1, 01-586 7331.
Tigress Designs, 25 Burmester Road, London SW17 0JL, 01-946 7870.
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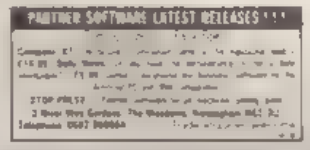

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Your complete guide to all the software released this week

Amstrad CPCs

Program *Solomon's Key* **Type** Arcade **Price** £8.95 **Supplier** US Gold, Units 2/3, Holford Way, Holford, Birmingham B6 7AX

This coin-op conversion is something of a cross between *Boulderdash* and *Gauntlet*: there's the maze, with some nice 'lateral thinking' touches as you build or remove blocks to make your way to the screen exits. Then there's no shortage of baddies, objects to avoid or remove.

Program *Armageddon Man* **Type** Wargame **Price** £12.95 **Supplier** Martech, Martech House, Bay Terrace, Pevensey Bay, East Sussex BN24 6EE

Amstrad conversion of one of the more playable wargames.

Set in the near future, the game puts you in control of world wide military and diplomatic decision making, as you attempt to avoid global warfare.

The mechanics of the game have been kept simple enough so that you don't have to be a member of MENSA to play it. See review in *Popular Computing Weekly*, August 7.

Program *Catch* **Type** Arcade **Price** £8.95 **Supplier** Martech, Martech House, Bay Terrace, Pevensey Bay, East Sussex BN24 6EE.

A combination wire frame shoot 'em up and strategy game with more locations than you've had hot dinners.

Atari XL/XE

Program *Guild of Thieves* **Type** Adventure **Price** £19.95 (on disc only) **Supplier** Rainbird, 64-76 New Oxford Street, London WC1A 1PS

You'll need a disc drive and a minimum of 64K to play this, but it's worth it.

You play a budding member of the guild attempting to prove yourself by ransacking a seemingly peaceful island.

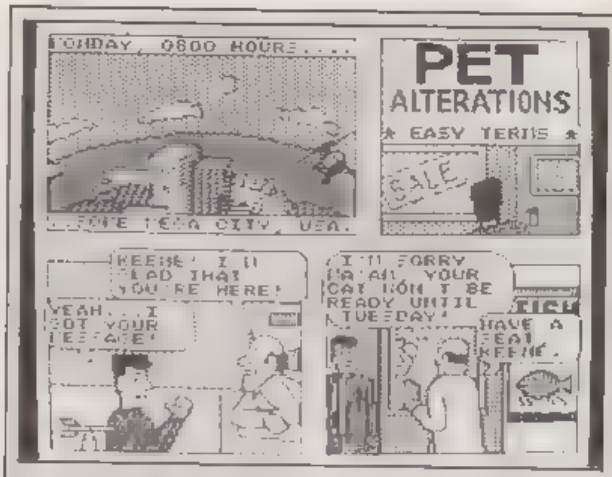
Guild of Thieves is Magnetic Scrolls' follow-up to *The Pawn*, and it's just as good.

Program *180* **Type** Simulation **Price** £9.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2A 4JH

Program *Druid* **Type** Arcade **Price** £9.95 **Supplier** Firebird, 64-76 New Oxford Street, London WC1A 1PS

Enjoyable *Gauntlet* clone, which predated *Gauntlet* itself in its original versions, with nice graphics but perhaps not quite as frantic as *Gauntlet* itself.

continued on page 51 ▶



Accolade's *Comics* didn't turn out to be quite what I'd expected. The game casts you in the role of Steve Keene, a private detective on the track of a kidnapped scientist.

Unlike a conventional arcade or adventure game, this game unfolds in front of you in the form of a comic strip, with the individual frames of artwork being 'drawn' on to the screen each time you press the fire key/button or make a decision.

It's in the same mould as Melbourne House's *Mugsy* and *Red Hawk*, and while it's undoubtedly slicker – and bigger – this type of game obviously still has some way to go before the comic strip idea works smoothly throughout.

All the advance information I'd received went on about the game being a 'living' comic strip in which you could interact with the characters you'd meet and affect the outcome of the game. I was expecting some sort of sophisticated parser that would allow you to enter text as you would do in an adventure, but the interaction turned out to be a bit more limited than that.

Many of the frames that make up the storyline are 'fixed'. You can't affect them in any way and simply read the captions for any information that they might present, or you can watch the limited animation in some of them.

In the parts that you can control, interaction consists of moving the joystick up or down to select a caption from a choice of three or four. Some places you may have a choice of objects to pick up, or exits to choose from, and this is done by moving an arrow to the appropriate choice.

There is no entering of your own text commands from the keyboard at all, so, as you might suspect, the interaction is really quite limited. This is especially so as, in many places, the choice of captions is simply a choice between a number of equally inane wisecracks.

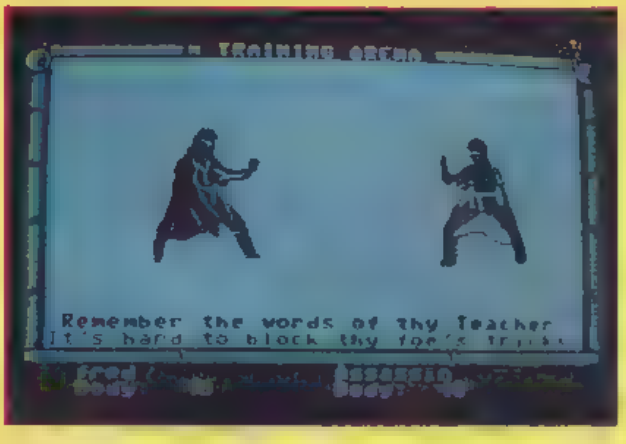
You do get a number of lives in the game, and if you reach an 'endpoint' by making a wrong decision somehow, you can go back to a point just before that decision and re-run your actions.

There are also some simple arcade sequences that provide the occasional change of pace.

***Comics* is by no means a bad piece of software. A lot of care has gone into the presentation of the game, and like any good cartoon strip it's quite entertaining to read/watch once or twice. But, like most cartoon strips it probably won't draw you back for repeated viewings.**

Cliff Joseph

Program *Accolade's Comics* **Type** Comic strip simulation **Machine** C64 **Price** £29.99 on disc **Supplier** US Gold, Units 2/3, Holford Way, Holford, Birmingham B6 7AX.



Mysticism meets martial arts

The mechanic that would perfect his work must first sharpen his tools."

I'd like to know how you go about sharpening a monkey wrench, but then that sort of inscrutable waffle is an occupational hazard when you're reviewing martial arts games.

Ever since the release of Melbourne House's *Exploding Fist* the stream of kick 'em ups has hardly ceased, and this week sees the release of yet another, though this is a bit more ambitious than most.

Microprose's *Moebius* looks enormously promising to begin with. Taking up two double-sided discs, the game adds elements of role-playing to all the usual violence.

It seems that some chap called Kaimen has strayed from the path of wonderfulness (that's what comes of sitting in laundries in boxer shorts), and run off with the Orb of Celestial Harmony.

As a result, the land of Khantun is going to rack and ruin – floods, plagues of giant beetles, young Conservatives, you name it, they've got it.

It is up to you, as a disciple of Moebius the Wind Walker, to learn the sacred disciplines and set off in search of the Orb in order to put things to rights.

At the start of each game you have to name the disciple that you wish to play (you can store any number of disciples on disc), and take him/her through three disciplines; karate, sword-fighting and divination. The first two are animated combat sequences, as you might expect. You can choose the speed of the action here, but even at top speed the action is a little sluggish.

Things aren't helped by the choice of keyboard controls, which I found rather cramped, and the game will not accept a joystick or allow you to define your controls.

Divination is an odd routine in which a yin-yang symbol attempts to escape from a chamber, and you have to keep it closed in.

Fortunately, it doesn't take too long to master these tasks (although divination seems a bit random), which is just as well because you can't start the main adventure until you've done this.

Once you're loose in the land of Khantun you have to penetrate the four planes of fire, air, earth and water to reach the Orb.

Along the way you will encounter a variety of assassins, guards, evil priests and the like, who will do their best to destroy you. Or, an even worse fate if you allow them to blot your Karma, and tempt you from the path of purity so that you are unworthy of possessing the Orb.

As you progress across the planes, you can interact in a simple manner with some of the characters you will meet.

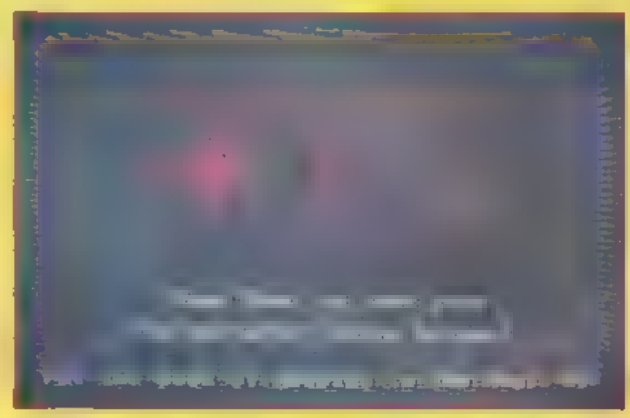
There is also a system of magic use, allowing you to learn how to casts spells. The simplest of these is hurling fire balls, but as you meditate and pray, and gain experience in other ways you will be able to attempt the Major magic spells (teleport, invisibility, and so on).

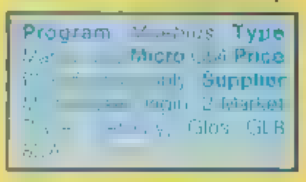
All this adds to the variety of the game, making it a bit like a Kung Fu role playing game, rather than pure combat. But it could have been more elegantly implemented, I think.

The animation in the combat sequences is perfectly fine (though a bit slow, as I mentioned), but the rest of the game is more cumbersome. As you wander around Khantun, the landscape and your own figure are represented by large block-like graphics, reminiscent of an old maze game. The map does scroll, and your figure moves across the landscape (one block at a time), but you couldn't really describe the process as 'animation'.

The author, Greg Mallone, had the right idea in trying to give *Moebius* more depth than most of the other martial arts games, but the implementation doesn't live up to the game's ambitions.

Cliff Joseph





Cascade: ACE 2

In New Releases, August 21, we published a colour picture alongside the review of *ACE 2* by Cascade.

You probably realised that the picture was largely decked out in PC compatible mauve, and therefore not all that it should be.

And you'd be right. We'll come clean. The picture was actually a screen from *Chuck Yeager Flight Trainer*.

The genuine *ACE 2* screen is shown right, from the Commodore 64.

◀ continued from page 49

Atari ST

Program *Championship Baseball* **Type** Sports simulation **Price** £24.95 **Supplier** Activision, ■ Pond Street, London NW3 2PN

The Spectrum version of this was released a couple ■ months ago, and I found the graphics and animation rather disappointing

However, this version not only has much better graphics (in fact they're wonderful), it also has the original American instructions which actually bother to explain the game to people (like me) who don't know too much about the intricacies of playing baseball.

Program *Manhattan Chaser* **Type** Arcade **Price** £24.95 **Supplier** Cyclops Software, 20 Gainsborough Gardens, Weston Lane, Bath BA1 4AJ

Acorn/Archimedes

Program *DeltaBase* **Type** Database **Price** £29.95 **Supplier** Minerva Systems, 69 Sidwell Street, Exeter EX4 6PH

There are a few press releases flying around from various companies claiming to have the first releases specifically for the Archimedes, but this is the first finished program ■ arrive here ■ *Popular*

I don't know whether all those would-be owners out there are waiting for a database to cut their teeth on but here it is, if that's what they want. It'll be faster than a Filofax, anyway

Commodore 64

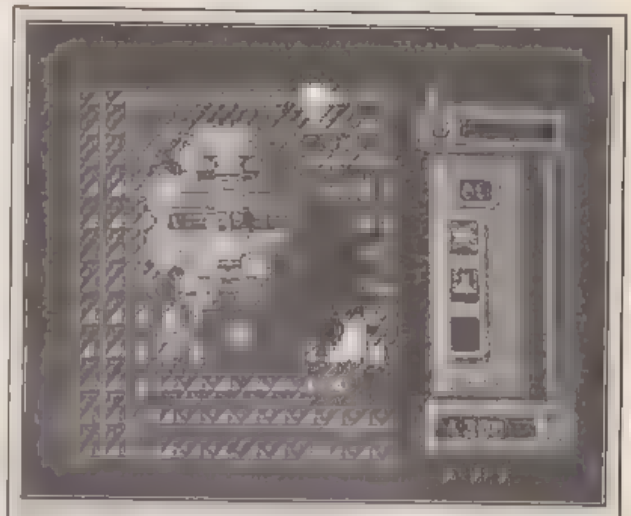
Program *Wiz* **Type** Arcade **Price** £8.95 tape £14.95 disc **Supplier** Melbourne House 8-10 Paul Street London EC2A 4JH

Program *Revenge II* **Type** Arcade **Price** £2.99 **Supplier** MasterTronic, 8-10 Paul Street London EC2A 4JH

The return (yet again) ■ Jeff Minter's mutant camels. This sequel set 6000 years after the last game, s basically more of the same crazed shoot 'em up action that you've come ■ expect from Minter

It's a little less straightforward to control the camels ■ this game, but if you want to see camels being bombarded by flying Y-fronts then this is the game for you

continued on page 53 ▶



Until now you could count the number of good shoot 'em ups for the Amiga on the finger of one hand. That game was *Starglider*, of course. But now, from deepest Cornwall, comes this conversion of the superb *Goldrunner*.

Your task is this: the Earth is dying of pollution (that's what you get for ignoring ecology groups) so a mass migration is on the cards. Unfortunately between here and the unlucky planet that you're moving to lie the ringworlds of Triton.

These Tritonites don't have the sense to set up a toll booth so you have to fight your way through. Large ships are too big so it's a job for a one man fighter (yeah, yeah).

You fly a fighter ship over the horizontally scrolling terrain, blasting at surface installations until you've reduced the power in that ring to zero. Then you find the exit and progress onto the next ring, after going through a bonus screen.

Although you can fly through the enemy fighters undamaged, their missiles are far more deadly. For one thing, when you change direction they do as well, so that they continue homing in on you.

The other things to watch out for are the large ground installations which you can run into with the expected fatal results.

Your ship comes armed with double firepower, a turbo booster to get out of those tight situations, and five armour points. Each hit you take reduces your armour and eliminates the booster, then goes the double firepower, and finally your life.

The terrain graphics are exactly the same as on the ST original so it's a pity more use wasn't made of the Amiga's extra 16 colours in this mode. The scrolling, when the booster is used, simply has to be seen. Even allowing for the fact that the playing area is only 70% of the screen, the scrolling is outrageously fast.

The accompanying music is less tinny and slightly more complex than on the ST, and still pretty good. The only other differences between this version and the original is that there is no joystick option, and the alien ships are different, and more well defined.

Goldrunner ■ undeniably the best shooting game for the Amiga, so far, but even so, this excellent game is surely only a foretaste of what the machine is really capable of.

Duncan Evans

Program *Goldrunner* **Micro** Amiga **Price** £24.95 **Supplier** Microdeal, PO Box 68, St Austell, Cornwall

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◀ continued from page 51

Program [illegible] **Type** Arcade **Price** £1.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2A 4JH

See Spectrum for comment

Spectrum

Program *Wiz* **Type** Arcade **Price** £7.95 **Supplier** Melbourne House, 8-10 Paul St, London EC2A 4JH

Program *Sample Editor* **Type** Music utility **Price** £9.99 (mail order only) **Supplier** Quasar Software, [illegible] Clerkenwell Road, London EC1

A sound sampler/editor for use with Ram Electronic's Music Machine interface

Program *Rapid Fire* **Type** Arcade **Price** £1.99 **Supplier** Mastetronic, 8-10 Paul St, London EC2A 4JH

All rather misleading. The inlay picture is reminiscent of Rambo, the plot is one of slum gang warfare. And where did the "Rapid" of the title come in?

Program *Plexar* **Type** Arcade **Price** £2.99 **Supplier** Mastertonic, 8-10 Paul Street, London EC2A 4JH

Another nice budget game on the Bulldog label. *Plexar* puts you in control of a bouncing alien attempting to boing his way along a series of booby-trapped nightmares. A bit like a budget version of *Trailblazer* with nice graphics and smooth animation.

Program [illegible] **Type** Arcade **Price** [illegible] **Supplier** Bulldog, 8-10 Paul Street, London EC2A 4JH

Program *Hack Pack* **Type** Utility **Price** £2.50 (available by mail order only) **Supplier** Softlink, 19 Dunloy Gardens, Newtown Abbey, Co Antrim BT37

A cassette containing over 100 pokes (infinite lives etc.) for almost as many games. The games are [illegible] fairly recent or popular ones, though a major oversight is the lack of pokes for *Head Over Heels* (because I need some).

CHARTS

Top Twenty

1	(1)	Milk Race	Mastertronic
2	(2)	BMX Simulator	Code Masters
3	(3)	Road Runner	US Gold
4	(4)	Run for Gold	Alternative
[illegible]	(5)	Exolon	Hewson
6	(6)	Paperboy	Elite
7	(10)	Barbarian	Palace
[illegible]	(7)	Destructo	Bulldog
9	(13)	Kik Start 2	Mastertronic
10	(11)	The Last Ninja	System 3
11	(9)	Cricket International	Alternative
12	(14)	Gauntlet	US Gold
13	(19)	Living Daylights	Domark
14	(–)	Super Robin Hood	Code Masters
15	(–)	Back to the Future	Firebird
16	(20)	Football Manager	Addictive
17	(8)	World Class Leaderboard	Access/US Gold
18	(–)	Avenger	Gremlin Graphics
19	(–)	Feud	Bulldog
20	(–)	Olympic Spectacular	Alternative

All figures compiled by Gallup/Computer Trade Weekly

Now that the summer appears to be over and it's raining buckets all over the place, what better way to spend the time than with a nice game of cricket (I can think of several ways actually, but for the purpose of this review let's just pretend that cricket and nirvana are more or less next door to each other).

Audiogenic's follow-up to *Graham Gooch's Test Cricket* is *Graham Gooch's All Star Cricket*. The sequel is basically a two-player game with one player representing England and the other Australia.

There are two modes of play; simulation or arcade. In simulation mode you select the teams and sit back and watch while the two teams slog it out on their own as in the original; in arcade mode you actually get to play.

You get to control both batting and bowling for each team, and both processes are kept nice and simple. When bowling, you first choose between off side or leg side and pressing the fire button starts the bowler's (very short) run-up. Then it's just a matter of timing the release of the ball for the best result.

Batting works on the same principle; once the bowler makes his delivery you have to time your strike as accurately as you can. Too soon and the ball will probably be an easy catch, too late and the wicket gets blown all over the place. But if you get it just right, you'll be rewarded with the ball apparently zooming right out of the screen towards you.

Sensibly, there's also a practice mode that gives you an indication of the best approach to both bowling and batting, and some reasonable but limited voice synthesis for 'Howzat' and crowd noises – a new feature of the *All-Star* version. You can select teams from the names that the computer has on file or enter your own, and the numbers of innings and overs can also be selected. All the fielding is automatic – once the ball has been hit the computer takes over, so that side of things [illegible] out of your hands.

The game is enjoyable enough although the action isn't terribly varied, being more or less limited to hitting the fire button and getting the timing right.

To be honest, if you've already got the original *Graham Gooch*, the extras in this new edition probably don't justify buying the *All-Star* version. I think you'd have to be quite a cricket buff to take a lot of interest in the business of selecting players and the numbers of overs and so on, but then, with most sports simulations you have to be fairly keen to get the most out of them anyway.

Cliff Joseph

Program *Graham Gooch's All-Star Cricket* **Micro** C64 **Type** Sport simulation **Price** £9.95 (£11.95 on disc) **Supplier** Audiogenic, PO Box 88, Reading, Berkshire.

Letting computers design computers

I would class myself as being fairly knowledgeable about computers, and I expect that many readers would say the same for themselves. Quite a few people can program a variety of high and low-level languages, while others could argue the pros and cons of any machine on the market. However, if I were to pose the question: "How many of us could design a micro-chip from scratch?", I think that a lot of us would feel less than confident with regard to our capabilities.

So what? It's not necessary to know the workings of a car to drive one, let alone know how to build one from scratch. There are any number of car manufacturers who are willing to take this responsibility for us. But if we take a closer look at the computer manufacturers, we can see that the vast majority use ready-made CPUs bought from micro-chip manufacturers. In other words, most computer companies don't know how to build a chip from scratch either.

Moving on, it strikes me that as technology progresses, becoming ever more complex, the longer it must take to train someone from novice to expert status in any affected field. The only ways in which people can keep up are either to learn faster, or start at a higher level of knowledge in the first place. One possible way of doing this is to remove the need to know all the intricate details of computer design.

This is, of course, what is already happening. In order to reduce training time, increase productivity, and improve quality, chip manufacturers use sophisticated computer-based CAD systems to do most of the work and optimise the final results. They are using computers to design computers.

It is my view that sooner or later (most likely later), new computers will be entirely designed and built by other computers, and us humans will have no hope of fully understanding the new systems. For now we can argue that the computer doing the designing will still have to be programmed by a human. However, this will not necessarily always be the case, and it may not make much difference anyway.

With the huge processing power available and complex artificial intelligence systems progressing rapidly, the actual program merely provides the means of manipulating data via a set of initially preset rules. If the program has the facility to formulate its own rules, produced through its own 'experiences', then it may continue to process and re-process data using methods beyond those originally programmed. The computer is not exactly thinking for itself; it just uses pure logic and a perfect memory of previous attainments and failures to reach an optimal solution; for example to the arrangement of logic gates or tracks on the surface of a micro-chip.

Can you imagine an expert system where you weren't able to query how it reached certain conclusions? Or more realistically where you could ask but wouldn't understand the reply? The only reason the computer may have the answer is because it has tested every one of the millions and billions of possible solutions and part-solutions. It has no more idea of 'why' than we do; the only answer it can give being 'because it is'.

The idea of computers designing their 'successors' will not be unfamiliar to readers of *The Hitchhikers Guide To The Galaxy*, and it probably doesn't sound quite as absurd as maybe it should. I don't believe that computers will ever 'take over the world'; however, it's always possible that a new design may one day get rid of the major bottleneck in any computer's operations: the human user.

Ambler

Puzzle No 273

Jamie dealt out a standard pack of 52 playing cards, face down on the table, in a straight row. Starting at the left hand end he turned over each card in turn until all 52 cards were face up. Starting again at the left, he turned over the first card, and then turned every other card. That is, he turned cards 1, 3, 5, 7, 9, . . . and so on to the end of the row.

He then repeated the procedure by turning the first card and every third card (ie 1, 4, 7, 10, . . . etc). He then continued in this way right up to a jump of 52. In this final case, of course, he was only able to turn over the first card as a jump of 52 cards took him past the end of the row of cards.

When the final card was turned up, how many of the cards were now face up?

Solution to Puzzle No 268

Answer: A = 10 B = 14 C = 12 and D = 64.

This problem is best tackled by taking pairs of values which interlock in the grid. In the program, values are taken initially for B and D as D interlocks with B squared, and C squared interlocks with E squared. Only when acceptable values are found are A and C considered.

The range of these values are from 10 to 31 for A, B, and C as they have three-digit squares, and 32 to 99 for D, as it has a four-digit square. In addition, 5 across (B^2) must end in a digit of 3 or greater as this end digit forms the first digit of D.

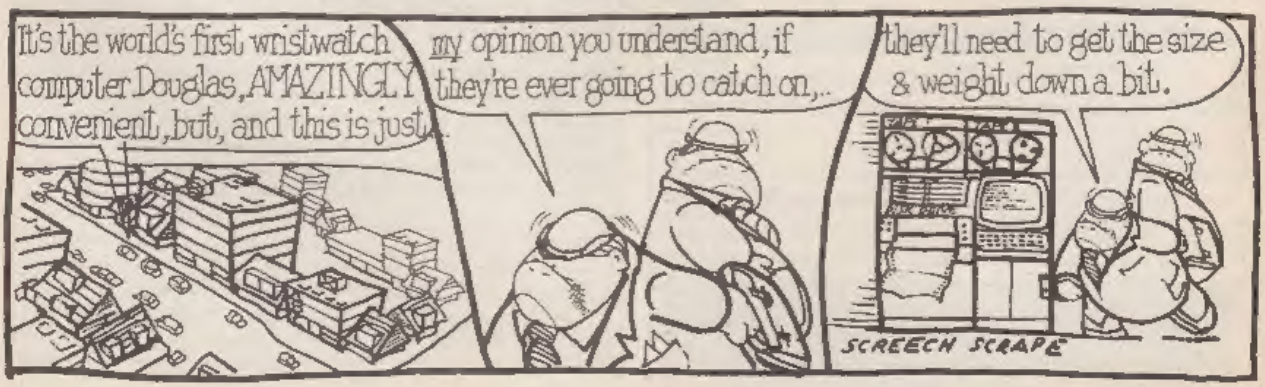
```
10 FOR B=12 TO 19:B$=STR$(B)
20 X=B*B:X$=STR$(X)
30 FOR D=32 TO 99:D$=STR$(D)
40 IF MID$(D$,1,1)<>MID$(X$,3,1)THEN 280
50 Z=D*D:Z$=STR$(Z)
60 IF MID$(Z$,3,1)<>MID$(X$,2,1) THEN 280
70 FOR C=10 TO 31:C$=STR$(C)
80 IF MID$(C$,1,1)<>MID$(X$,1,1)THEN 270
90 Y=C*C:Y$=STR$(Y)
100 IF MID$(Y$,2,1)<>MID$(Z$,1,1) THEN 270
110 FOR A=10 TO 31:A$=STR$(A)
120 IF MID$(A$,1,1)<>MID$(Y$,1,1) THEN 260
130 R$="":W=A*A:W$=STR$(W)
140 FOR F=1 TO 2
150 R$=MID$(W$,F,1)+R$
160 NEXT
170 IF MID$(R$,1,1)<>MID$(A$,2,1)THEN 260
180 IF MID$(R$,2,1)<>MID$(Z$,2,1)THEN 260
190 D$=""
200 FOR F=1 TO 2
210 D$=MID$(B$,F,1)+D$
220 NEXT
230 IF MID$(D$,1,1)<>MID$(Y$,2,1)THEN 260
240 IF MID$(C$,2,1)<>MID$(B$,2,1)THEN 260
250 PRINT "A=";A$;" B=";B$;" C=";C$;" D=";D$
260 NEXT A
270 NEXT C
280 NEXT B
290 NEXT D
```

Winner of Puzzle No 268

This week's winner is Kevin Hebbard of Tilbury, Essex who will receive £10.

Rules

The closing date for Puzzle 273 is September 23.



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